RAILROAD GAZETTE

QUARTO VOL. XXIV.—NO. 50. A JOURNAL OF TRANSPORTATION ENGINEERING AND RAILROAD NEWS. THIRTY-SEVENTH YEAR.

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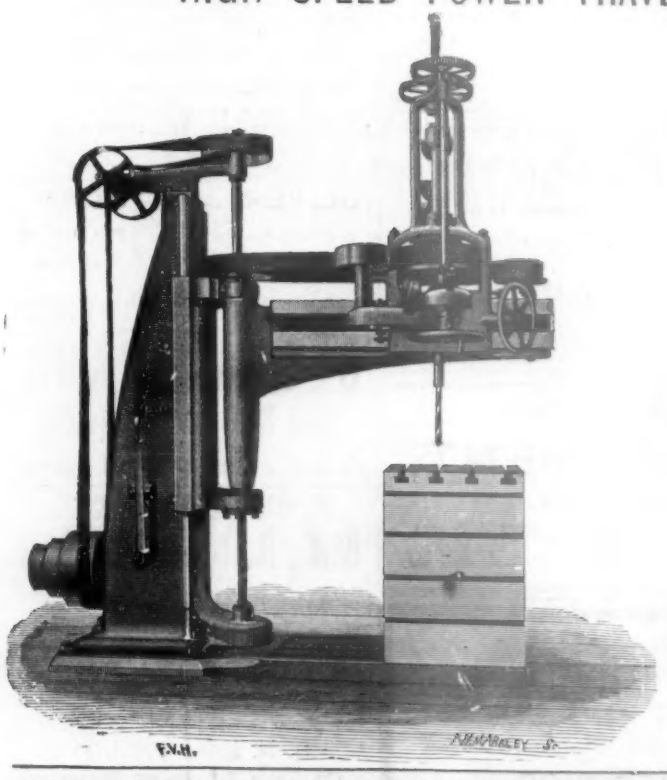

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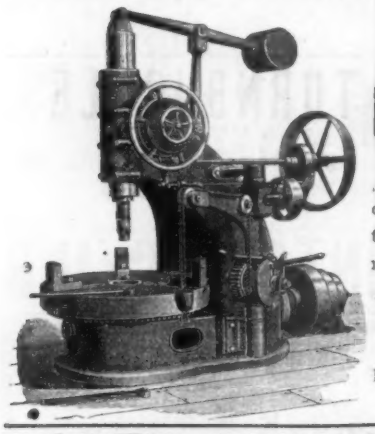

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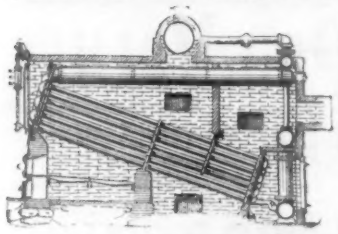

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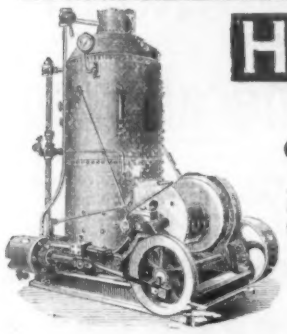

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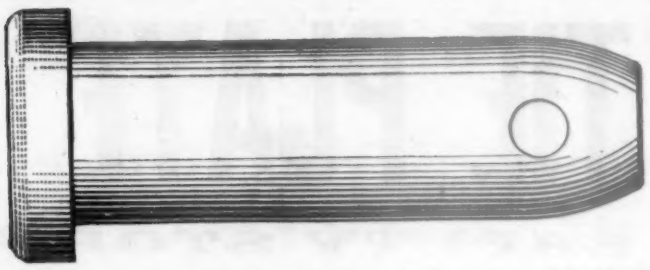

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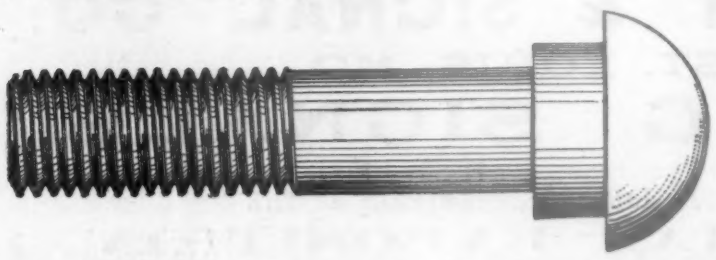

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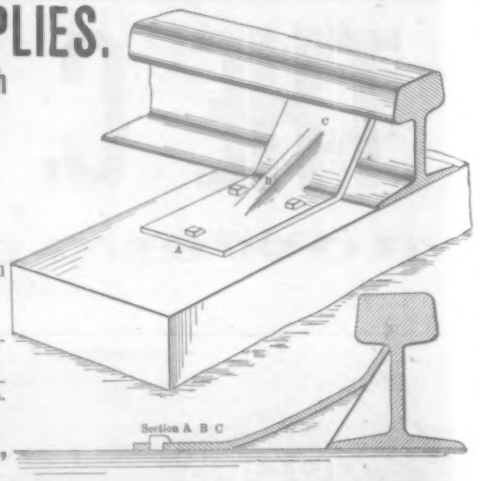

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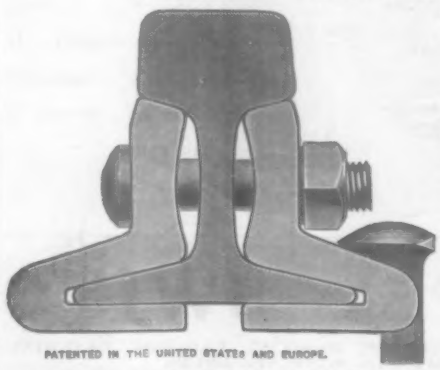

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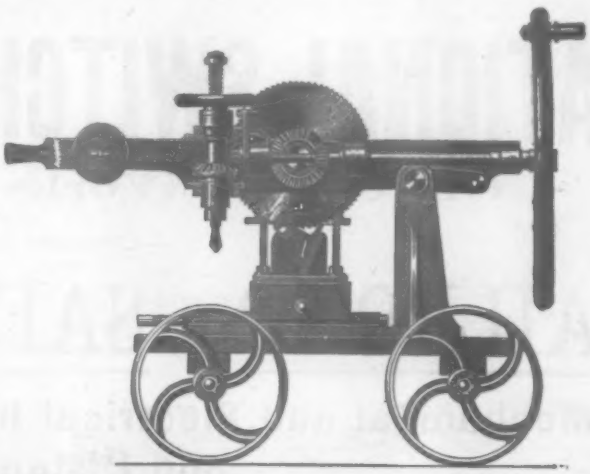

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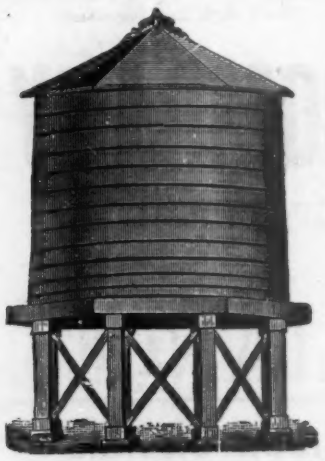

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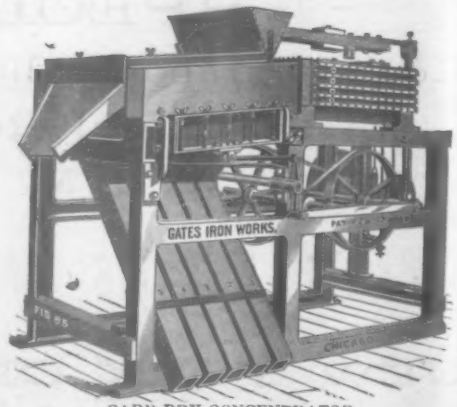

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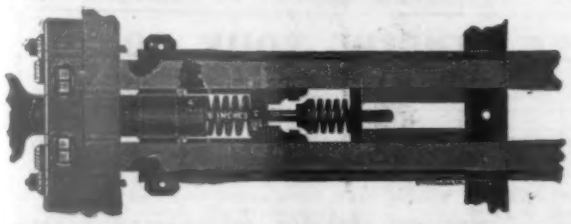

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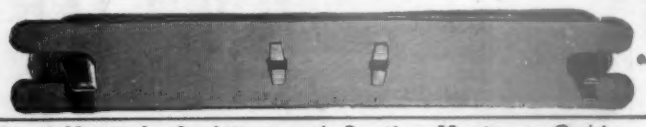

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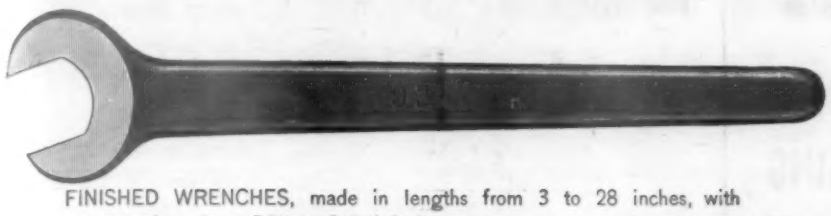

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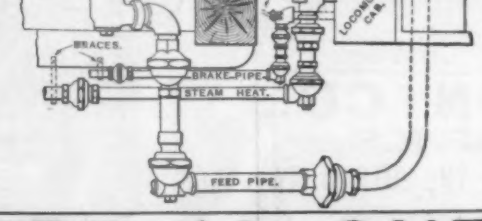

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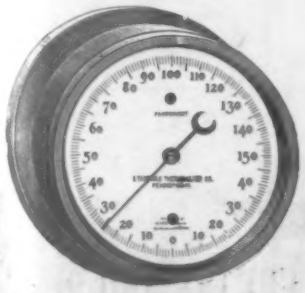

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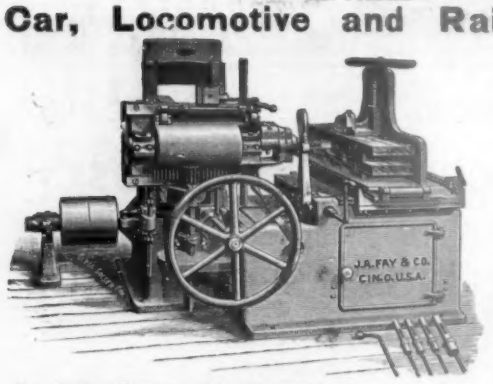

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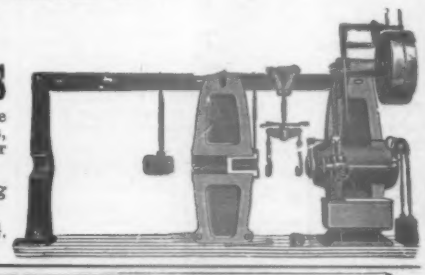

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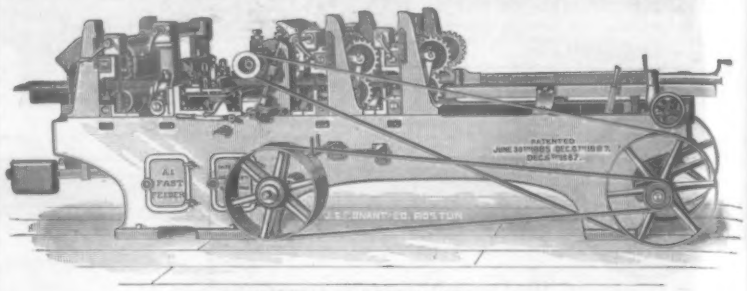

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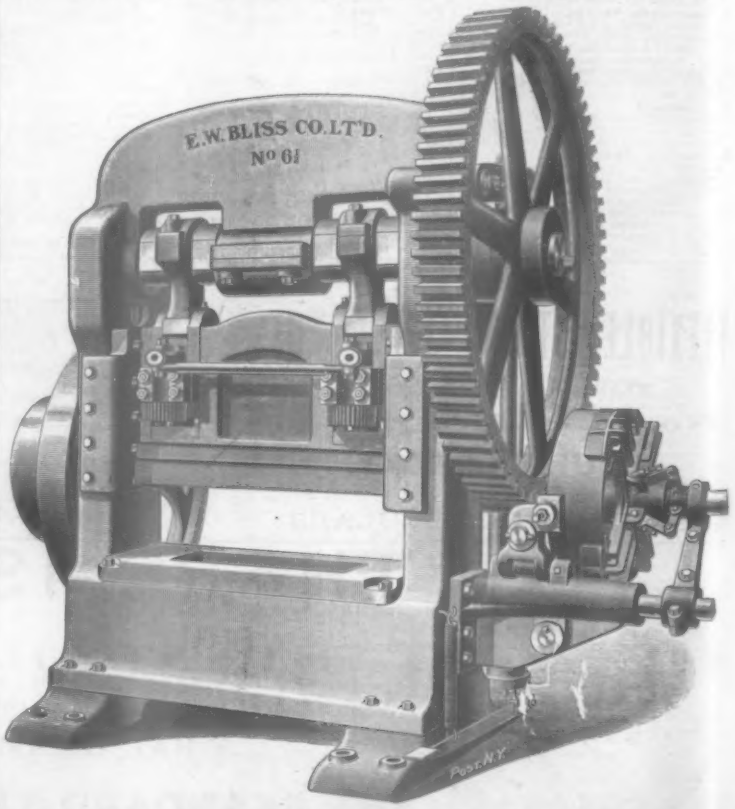

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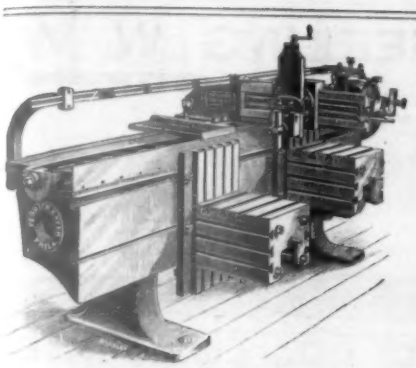

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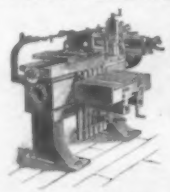

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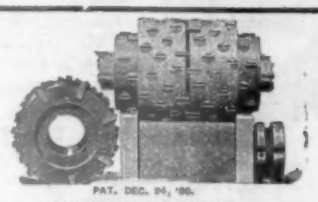

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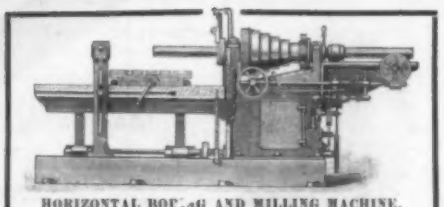

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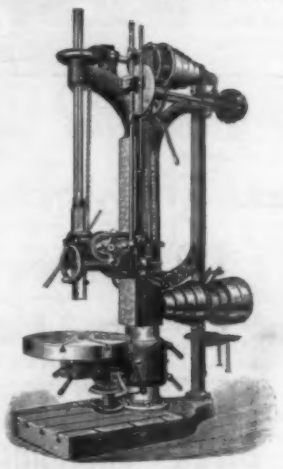

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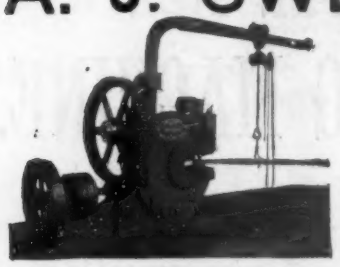

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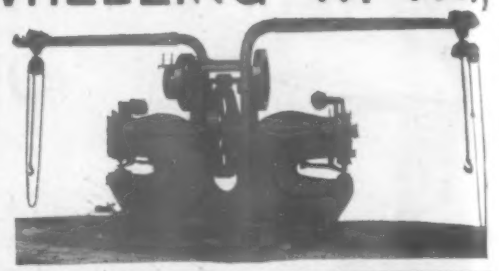

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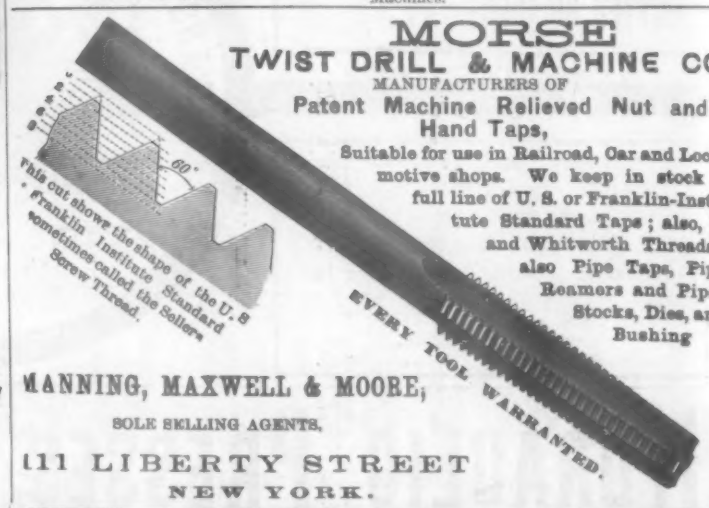
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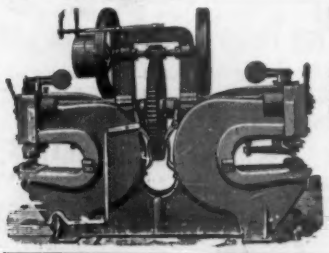

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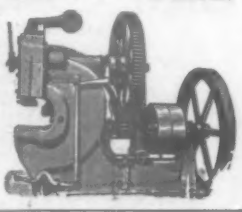

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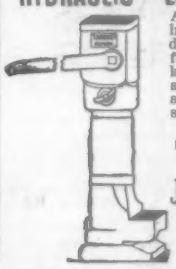

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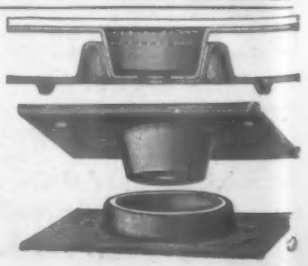

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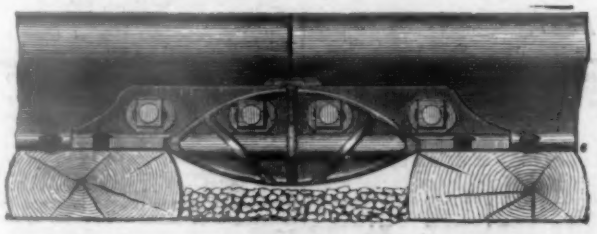

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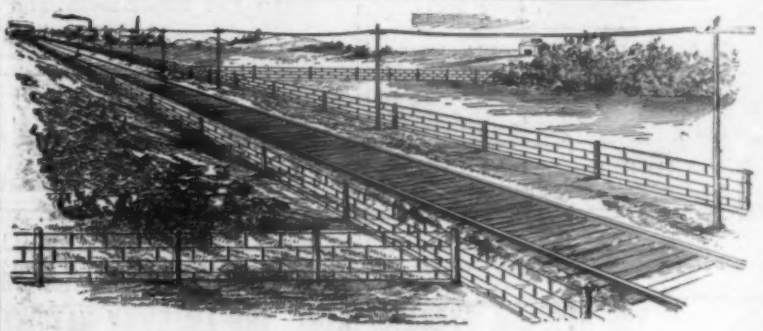

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Dividends on this stock will be cumulative at 8 per cent. per annum, payable quarterly, and this stock will have preference over the common on all the property and assets of the company. No bond or mortgage can be put upon the property except by consent of 90 per cent. of the Preferred Stockholders. All stock is full paid and non-assessable, stockholders having no personal liability whatever.

AUTHORIZED CAPITAL, $3,000,000. SHARES, $100 EACH, DIVIDED INTO 10,000 SHARES COMMON OR GENERAL STOCK, $1,000,000.

20,000 SHARES PREFERRED STOCK, OF WHICH 2,500 SHARES REMAIN IN THE TREASURY, LEAVING PRESENT ISSUE, $1,750,000.

This company is formed to acquire control of and continue the business heretofore conducted by The Pratt and Whitney Company, of Hartford, Conn., one of the largest and most widely-known manufacturers of machinery and tools in this country. The business has been established over thirty years, and has been constantly increasing in volume and profits.

VENDORS' STATEMENT.

The property has been appraised by Mr. J. F. Holloway, Vice-President and Treasurer of Henry R. Worthington (incorporated), New York, assisted by Mr. John R. Hills, of Hartford, in valuing the real estate.

Adding to their appraisal the book accounts, bills receivable, and cash, makes the total assets **$2,134,000, exclusive of patents, good-will, or trade marks,** being $384,000 in excess of Preferred Stock now issued.

The books were examined for 1889, 1890 and 1892 by Messrs. Deloitte, Dever, Griffiths & Co.

Their report shows earnings equal to 8 per cent. on the Preferred stock, 10 per cent. on the Common, and leaves sufficient surplus for salaries, management and contingent expenses.

Detailed reports of the appraisers and accountants may be seen at the office of any of the bankers, or prospectus containing them will be sent on application.

The Secretary of the company writes: HARTFORD, Conn., Nov. 5, 1892.

"Present indications are that the volume of business and the profits of the company in the year 1892 will be approximately the same as the average for the last three years. Orders are coming in as freely now as at any time in the existence of the company, and prices are easily maintained."

The Preferred Stock remaining in the treasury, or such part as may be required, will be sold during the progress of contemplated extensions of the buildings. The assets will be increased to the full amount of the additional stock issued, and the managers express belief that this course will increase the earnings $50,000 to $75,000 per annum.

The customers of the company consist of the railroads and manufacturing interests of the country, and extensive sales are also made abroad.

THE BUSINESS IS INDEPENDENT OF THE QUESTION OF TARIFF AND DOES NOT RELY UPON PROTECTION.

The present managers of the company agree to remain for a period of five years at moderate salaries, the maximum of which is fixed.

The following gentlemen have consented to serve as Directors: Mr. F. A. PRATT, Mr. AMOS WHITNEY, Hon. HENRY C. ROBINSON, Mr. ROWLAND SWIFT, President American National Bank; Mr. JOHN R. REDFIELD, President National Exchange Bank, Hartford; Mr. R. F. BLODGETT, Mr. J. E. WOODBRIDGE Mr. GEORGE M. W. REED, Hartford; Mr. C. C. CUYLER, of Cuyler, Morgan & Co.; Mr. WILLIAM M. KIDDER, of A. M. Kidder & Co., New York.

Transfer Agents in New York, MESSRS. A. M. KIDDER & CO.

Registrar of the Stock, N. Y. GUARANTY & INDEMNITY CO.

Counsel, Messrs. CARTER & LEDYARD, New York: HON. HENRY C. ROBINSON, Hartford, Conn.

Auditors, Messrs. DELOITTE, DEVER, GRIFFITHS & CO.

THE SUBSCRIPTION LISTS WILL OPEN ON THURSDAY, DEC. 15, 1892, AND CLOSE ON OR BEFORE SATURDAY, DEC. 17, 1892.

Payments will be made as follows:

10 PER CENT. ON APPLICATION. 40 PER CENT. ON ALLOTMENT. 50 PER CENT. ON JAN. 3, 1893.

The right is reserved to reject or reduce any application. Upon final payment, provisional negotiable receipts will be issued by the New York Guaranty and Indemnity Company, to be exchanged for engraved certificates of stock in due course.

N. Y. Supreme Court, Dutchess County.

LEWIS H. VAIL, as trustee for the holders of the first-mortgage bonds of the Poughkeepsie, Hartford & Boston Railroad Company, *Plaintiff.*

Against

THE POUGHKEEPSIE, HARTFORD & BOSTON RAILROAD COMPANY, Edward Elsworth, individually and as mortgagee in a certain mortgage deed recorded in the office of the Clerk of the County of Dutchess, in Liber 156, pages 213, etc., of mortgages, and as trustee under such mortgage deed, and others, *Defendants.*

Pursuant to a judgment of foreclosure and sale granted on the 6th day of February, 1886, and entered in the Dutchess County Clerk's office in an action wherein John P. Adriance, as Trustee, etc., was plaintiff and the Poughkeepsie, Hartford & Boston Railroad Company and others were defendants (the said John P. Adriance having died and the said Lewis H. Vail having been substituted as Trustee and Plaintiff in said action), I, the undersigned, the Referee appointed by the said judgment for that purpose, will sell, at public auction at the east front door of the Court House in the City of Poughkeepsie, Dutchess County, New York, on Thursday, the 26th day of January, 1893, at twelve o'clock noon, the premises described in said judgment and in the mortgage therein referred to, and which are therein described as follows:

"All and singular, the railroad of the said Poughkeepsie, Hartford & Boston Railroad Company" (now known as the New York & Massachusetts Railway), "now or hereafter to be constructed, being about 47 miles long and extending from the Hudson River at the City of Poughkeepsie through, or as near as practicable, to the Villages of Salt Point, Stanfordville, Stissing and Pine Plains, in Dutchess County, and Boston Corners, in Columbia County, New York, to a point in the line between the States of New York and Connecticut, near the village of Millerton, in the State of New York, the said railroad connecting at that point with the Connecticut Western Railroad, together with all and singular the franchises of the said Poughkeepsie, Hartford and Boston Railroad Company, and its equipments property, tolls, rents, issues and profits, its lands, tenements, buildings, fixtures, machinery, rolling stock, goods and chattels connected with the operating of the said railroad, or appurtenant thereto, and all rails, ties, fencing and erections, right of way and easements, including all property, real and personal, now or hereafter to be acquired by the said Poughkeepsie, Hartford & Boston Railroad Company, either in law or equity, of what kind soever purtenant thereto.

"Excepting and reserving out of the above described premises and property that part thereof lying between Boston Corners and state line, a particular description of which is contained in a deed thereof made by Abram J. Rose, Referee to the Hartford & Connecticut Western Railroad Co., dated 1st of April, 1881, and recorded in the Dutchess County Clerk's office in Liber of Deeds 216, pages 466, etc., on the 5th day of April, 1884, and also recorded in the Columbia County Clerk's office in Liber of Deeds 76, pages 258, etc., on the 9th day of April, 1884, to which deed and the records thereof reference is made.

"The premises hereinbefore described include and this decree is against those certain lots and parcels of land described as follows:

All that land in the town of Stanford, Dutchess County, and in North Hamilton street, in the City of Poughkeepsie, mentioned and described in a declaration of trust made by George Innis to the Poughkeepsie & Eastern Railroad Company, and dated August 14, 1871, and recorded in the Dutchess County Clerk's office in Liber 176, page 368, of Deeds.

"Also all that land in said City of Poughkeepsie lying south of Oakley Street, which was conveyed to George Innis by the Poughkeepsie, Hartford & Boston Railroad Company by deed dated July 15, 1875, which is recorded in the office of the Dutchess County Clerk, in Liber 181 of Deeds, page 95."

Pursuant to the decree aforesaid all said mortgaged premises will be sold by me in one parcel.

ABRAM J. ROSE, *Referee.*

Dated Dec. 6 1892.

WILKINSON & COSSUM, *Plaintiff's Attorneys,* Poughkeepsie, N. Y.

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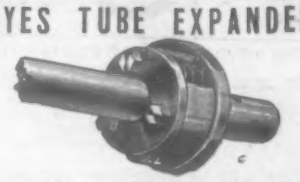

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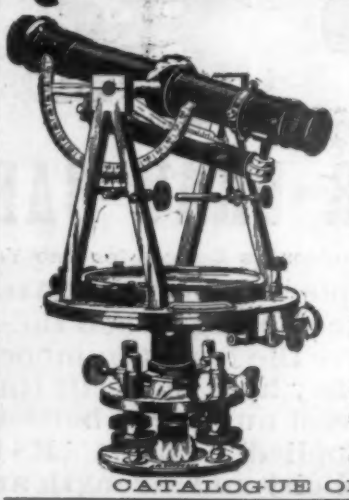

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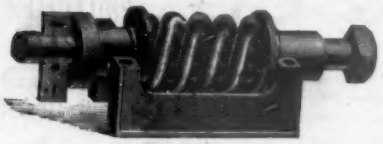

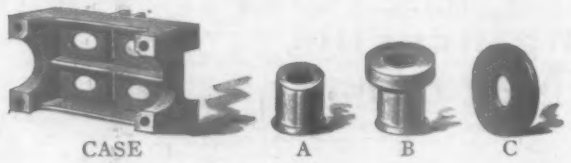

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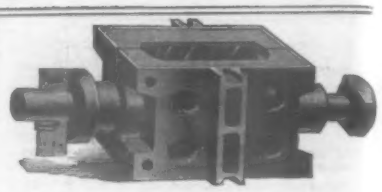

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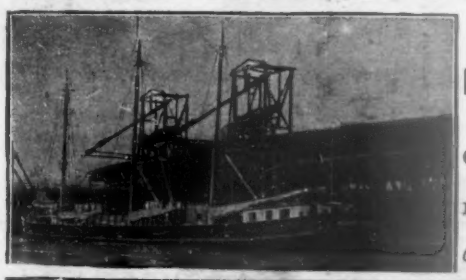

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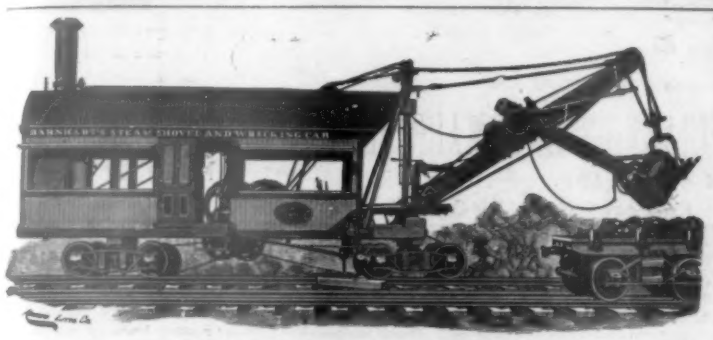

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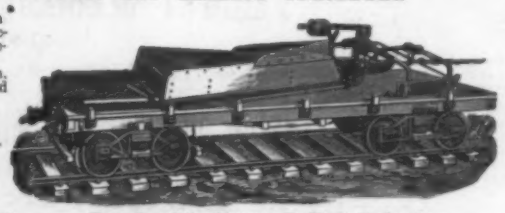

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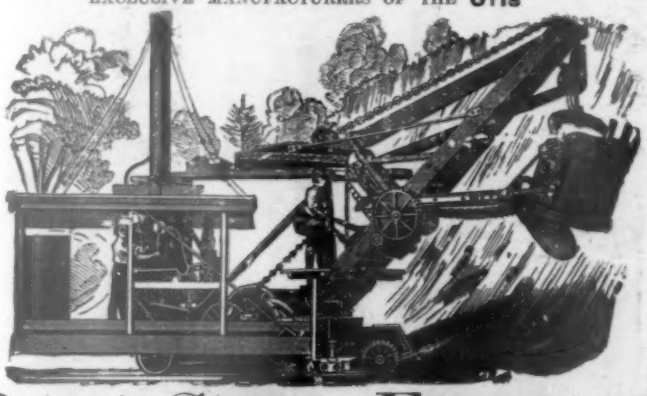

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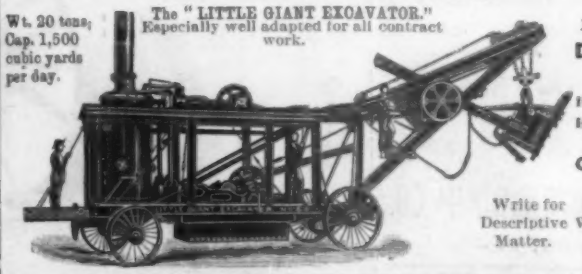

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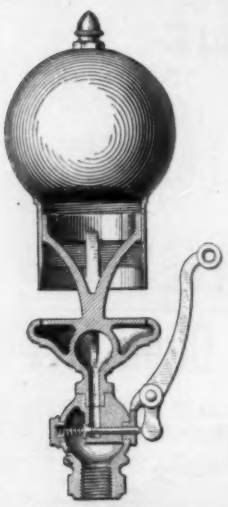

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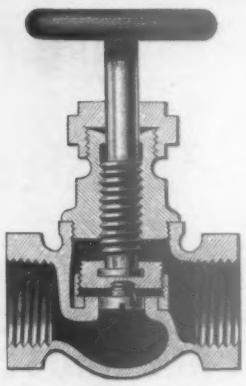

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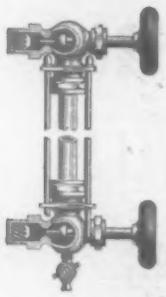

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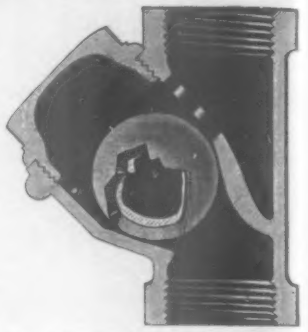

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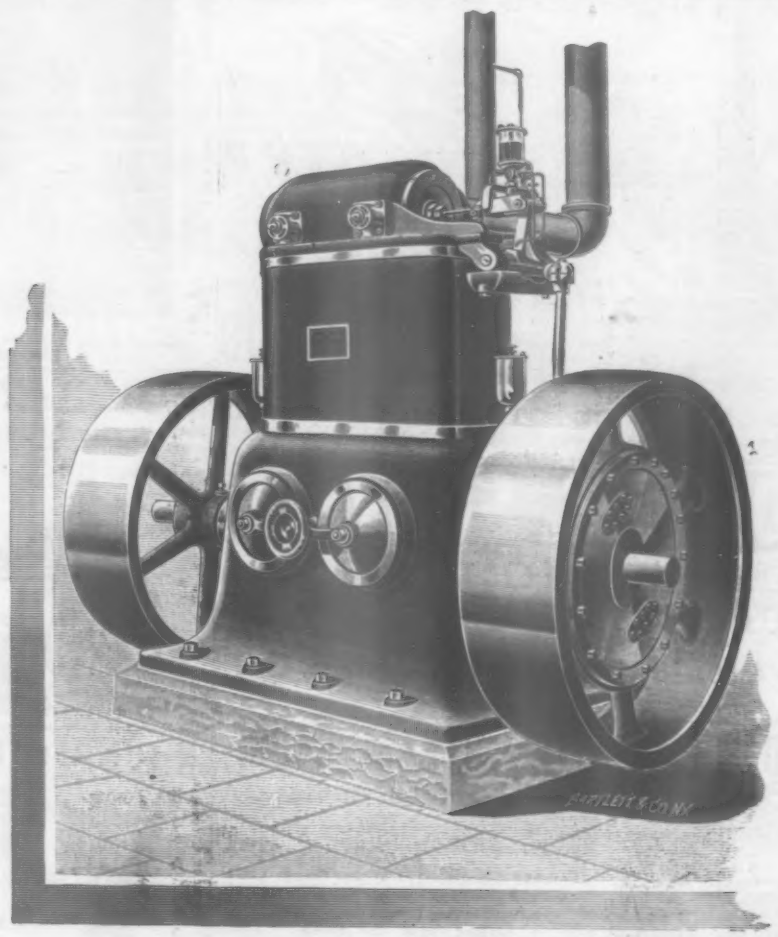

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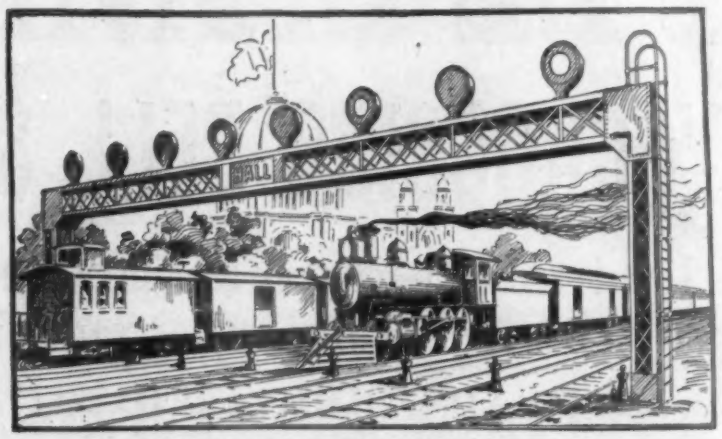

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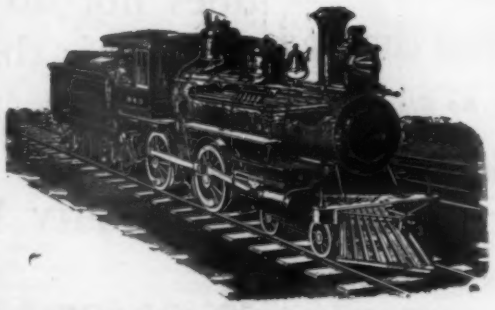

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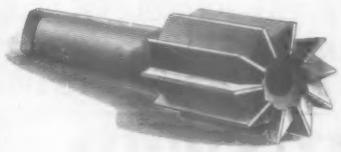

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RAILROAD GAZETTE

FRIDAY, DEC. 9, 1892.

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Contributions.

The Interstate Commerce Law and Ocean Transportation.

NEW YORK, Oct. 26, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your article of last week on Judge Wallace's decision in the United States Circuit Court, at New York, forbidding the Texas & Pacific to carry freight from New Orleans to El Paso for European shippers cheaper than for merchants whose shipments originate in New York. It seems to me that the most important feature of this decision is that touched upon in your last paragraph, the dignity given to the acts of the Interstate Commerce Commission. That body has made some decisions not founded on justice, and in rendering opinions has not always rightly summarized the evidence given before it, but it is well that the court has done this much to strengthen the plea of the friends of the Commission, that its acts should be treated as *prima facie* wise, as well as lawful.

On the main question of this Texas case, however, I am in doubt. Is the command not to pro-rate with an ocean steamer based on good economic grounds, or is it made merely because it is deemed best to adhere to the principle that we should limit our laws as far as possible to our own territory? I am neither a protectionist nor tariff reformer, nor a free trader—that is, I have no political feeling or opinion in this matter; but is not this one of those cases which the courts can never settle, and which therefore will hang at loose ends until Congress passes a law? The decision of the United States Court, at Springfield, Ill., in February last, practically applies the same rule that Judge Wallace lays down; that is, the Interstate Commerce Commission, and, virtually, all our instrumentalities for regulating transportation rates, may as well keep hands off so far as concerns anything outside the United States. Why is not this the correct principle? If the Texas & Pacific obeys this decision and raises its foreign rate it loses the business; but the California merchants still get their goods in Europe, bringing them via Panama, and where does the New York shipper gain anything? If the Texas road reduces its New York rates it will probably run against the long-and-short haul section of the law, or in any event will sacrifice some income without doing anybody a bit of good. I, for one, should like to see the railroads compelled to stop pro-rating with ocean steamers, as that practice opens the way to grave abuses, but how is it possible to do it?

L. T. R.

Electricity for Standard Railroads.

BUFFALO, N. Y., Nov. 2, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. George Westinghouse, in a communication to your paper appearing in issue of Sept. 23, presents facts which, if true, do not afford much promise for the use of electricity on standard railroads; but there are some points he makes upon which more information would interest many.

The figures given by Mr. Westinghouse apply to operation of trains by electricity taken up from the rails or from overhead wires, and he refers to a steam plant for the generation of electricity fitted with stationary steam boilers, engines and generators to produce 1,600 H. P., the amount of power he estimates necessary to operate a standard locomotive under present conditions. The total investment in this plant he estimates at $59,000 and then adds $22,000 for an electrical motor of 1,400 H. P., making a total of $81,000 investment required to take the place of a steam locomotive costing $10,000 which would do the same work, developing 1,200 H. P. at a cost, or rather an investment, of $8 per horse power.

Now suppose that this power was produced by the Cataract Construction Co., who are developing the power of Niagara Falls, and supplied to railroad companies at no cost whatsoever to them for plant to produce it. That would materially alter the case. And yet this may be an accomplished fact in a very short time.

The Cataract Co. have principally to overcome the obstacle of producing the power, turning it into electrical force to transmit it, and back into the ordinary type of power to use it for general manufacturing purposes. But with power supplied railroads they are situated very differently. They can deliver the power as electrical force just as required by the railroad company. As the Cataract Co. has contracted for power delivered to manufacturers at Niagara Falls at a price of less than $5 per horse-power per annum for 24 hour power, there are manifest possibilities in the case even when the investment in generators to take the power from the turbin wheels is considered.

It would be interesting to know what is considered a fair cost for producing steam power on a locomotive per horse power per annum for 24-hour power, based upon the work usually done, that a comparison might be made. Ordinary steam power supplied in cities readily sells for $25 to $50 per horse power per annum for 10-hour power (according to quantity delivered), and steam power produced on a locomotive is very much more expensive.

Mr. Westinghouse also estimates the motor for locomotive in his figures at 1,400 H. P. But why? Does it require as much power to drive cars or trains with electricity, used in the manner he refers to, as with steam? If storage batteries are used it undoubtedly would, but otherwise not. When we see cars carry in many cases as many passengers as may be found in the standard railroad cars, doing good work at such speeds as 16 to 25 miles per hour with motors of less the electrical equivalent of 50 H. P., why is it necessary to calculate on motors of many times that power for standard railroad service? At the convention of Mining Engineers two weeks ago, at Neversink Mountain Hotel, Reading, Pa., I saw a trolley car with over fifty people in it make quite as satisfactory progress up a very heavy grade as did a standard locomotive used on the same track shortly after. No one questions that electrical power, as at present applied, is totally inadequate for general freight and passenger service on standard railroads, but it is making great progress.

The steam locomotive, with its 1,400 H. P. necessary to do its work, is a totally different factor in railroad operation from the electric motor. So far as my observation goes, the latter, with one-third the power, or less, will do quite as good work in service. The locomotive must have the weight to get the traction and its power must necessarily be in proportion to its weight and speed. The greater the speed the less the traction, and, therefore, the more power and weight required to do given work; the percentage of power absolutely wasted must increase with the speed. Is it fair to base calculations upon what must be invested in steam engines to overcome the difficulties they contend with as a proof of what must be invested in electrical motors? What is the relative difference between actual power of a steam locomotive required to accomplish the transportation of a certain number of passengers and the electrical motor power necessary to do the same thing?

It would appear to me that with electrical power used as referred to we could have lighter cars and greater safety with better control of trains. Why have locomotives and trains weighing three to four hundred tons if electrical equipment weighing one-quarter as much will carry the same number of passengers equally well?

P. H. GRIFFIN,
President New York Car Wheel Works.

The Kinsman Block System.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Since the publication of an illustrated article on "the Kinsman Block System" in the *Railroad Gazette* of Sept. 23, numerous inquiries have been made regarding the merits of our block system for controlling trains, as compared with the devices of other parties. These inquiries seem to be indicative of a very general interest in the subject, which justifies me in going into the details of the subject to a considerable length. . . .

During the latter part of the forties, and early in the fifties electricity was used for detecting and signaling an abnormal condition of the track, and the presence of a train, by the use of track circuits and other electro-mechanical devices, with varying success. The greatest difficulty experienced at that time was due to unsatisfactory and imperfectly constructed batteries and the great difficulty of converting the electrical operations into mechanical indications. The currents generated by the batteries of those days were not calculated to furnish sufficient energy to operate the mechanical apparatus, which must of necessity be heavy enough to withstand the wear and tear of continued out-of-door use.

Within recent years the desirability of absoultely controlling the movement of railroad trains, led a number of apparently inexperienced inventors to devise means for signaling to the engineer by means of audible signal apparatus located in the cab of the engine. These efforts were followed by others, evidently as inexperienced as the first, to blow the whistle of an engine, or to break or open the air pipes of the brake system. Following these came the effort to cut off the steam supply. All these are commendable in themselves, but bear evidence of little knowledge of either the electrical or mechanical conditions involved in such an undertaking. All the inventors seem to be impressed with the liability to fail (physically or otherwise) of the engineer, train dispatcher, telegraph operator, rear brakemen, and others upon whom the proper movement of trains depend at the critical moment. This fact seemed not only worthy of their attention, but has been commented upon after the occurrence of every serious accident which has ever happened from such causes.

The lack of railroad experience in every single instance, is shown by the fact that the inventors always used apparatus which required either alteration in the construction of the locomotive or the use of apparatus which interfered with the regular operation of the locomotive, in case the apparatus was accidentally put into action. One inventor shows the valve in the steam passage held open by strings or cords, attached to the side of the engine by an arm projecting from the side of the locomotive. The design was to sever these cords by a knife hinged to some part of the roadbed and lying below the level of the track when not in use. When it was found desirable to stop the train these knives were drawn into an upright position where they engaged with the cords holding the valve, thus severing them and allowing the valve to close by the pressure of the springs conveniently located. Another replaced the movable knife in the roadbed by a hook which was expected to engage a ring on the end of a chain suspended from a passing train whenever it was found desirable to set the air brakes. Others have used "triggers" attached to the locomotive which were expected to come in contact with arms projecting from posts located along the side of the track, or raised from the roadbed. These arms or triggers were in most cases arranged to operate electrically. Others again, have tried to control the train by causing such arm or trigger to disrupt some part of the train pipe. Those who have tried to combine the steam cut off, and airbrake operating arrangements under one head have apparently fallen into the error of believing that railroad men would consent to the forcible movements of the throttle-lever, and engineer's valve, forgetting that good railroad practice would not permit the use of any apparatus likely to materially alter the present method of operating. Neither could they be induced to adopt complicated devices, such, as small engines and dynamos or batteries located upon the engine to be cared for by the engineer.

An experiment known to the writer was made where three pony engines were used in one cab, one running continuously to operate a dynamo, another to operate the air-lever, another to turn the steam on and off. Another experiment had a sort of eccentric motion and knee-joint movement arrangement located outside of the track, which was pulled by a wire or chain from a switch, or signal stand. This worked fairly well till a small stone got into the working parts and stopped every train passing that way. If it had been used during cold weather the up-and down motion would soon have packed the clearance space with snow and ice. Anything movable on the roadbed is unreliable and sometimes dangerous.

In the class referred to as "trigger" or arm operating devices, the promotors evidently forgot that in order to utilize electricity it would be necessary to use extremely light and delicate apparatus along the track or on the roadbed; that such apparatus was more than likely to be disarranged by the jar of the train, or the many other conditions attending such use in unprotected places, to use anything sufficiently strong to withstand these unfavorable conditions would involve an amount of pounding by rapidly moving trains to an extent unknown to any but practical engineers. Apparatus heavy enough to be reliable in this respect must of necessity be operated manually; the operator of such apparatus being quite as likely to fail, as the engineer. Furthermore the necessity for manual attention greatly restricts its utility even in localities where such attention could be furnished.

In the Kinsman system all the objections to the systems referred to have been overcome in a simple and practical manner. By referring to the illustrations [see *Railroad Gazette* Sept. 23] the reader will see that nothing movable upon the roadbed is used. The guard rail to which the electric circuit wires are securely attached, is as firmly fixed as the way itself. The contact arm is made to travel in the flange way, and always in line with the wheel flange. Experienced individuals will at once realize that no shock to this arm is likely to be felt, as the beveled face of the contact arm takes the beveled end of the 30-ft. guard at the beginning and end of each section rail in the same manner as the wheel. The electrical contact is made during the passage of this arm, which rubs against the guard rail with sufficient pressure to remove all question of a perfect and reliable electric contact. The current, as will be seen, is taken to the magnet in the cab by a suitably

protected insulated wire, returning by a similar arm on the opposite side of the engine or car.

The mechanism on the engine, which is very simple and durable, is shown in your issue already referred to. It will be seen that it acts, first, to shut off steam, and second, to put on the air brakes; the second operation following the first immediately. The engineman can at once regain control of the throttle by throwing the lever forward.

No change has been made in the usual methods of operating the steam or air valves, in fact, if the apparatus furnished by this company was enclosed, no change would be noticeable to the engineer until such time as he fails to see and obey the danger signal or other reasons for reducing speed or coming to a full stop. Neither does this arrangement prevent his obeying a visual signal in the ordinary way should he have occasion for so doing. Too much importance cannot be laid upon this feature or upon the fact that we utilize the only point of absolute clearance upon a railroad under all conditions of train construction or rates of speed. It might be well to call attention here to the fact that an arm projecting below the level of the rails either outside or between them would receive severe shocks every time a planked crossing, switch, or crossing rail was encountered, while anything on the roadbed projecting above the level of the rails ought not to be considered for a moment. The question of listing of cars, or the swaying motion imparted by high rates of speed on imperfectly constructed roads, are elements worthy of consideration in this connection. Our contact arms are fixed to the equalizing or truss bar, which always bears the same relation to the rail as the wheel.

A quotation from an eminent expert and railroad man is not out of place here. He says: "Mr. Kinsman has gone as far in the question of train controlling as it seems possible to go; having automatically done the work of an engineer, nothing remains to be done."

FRANK E. KINSMAN, *President.*

The Pennsylvania System of Steam Heating.

The Pennsylvania has had in use for some time a return system for steam heating trains and we illustrate by the accompanying diagrams the arrangement as now used. The general plan of the pipes in a car is shown in the diagram fig. 1. In this case, the locomotive being to the left of the diagram, steam enters the car from the train pipe through the lower three-way cock, thence through the four-way cock and regulating valves *DD* to the radiating pipes in the car, and then returns by the return pipe to the drip cock, and thence back through the four-way cock and the upper three-way cock to the return train pipe. The locomotive is provided with a vacuum pump which is placed in the front of the wing of the tender on the fireman's side; and being enclosed in the space formed for it in the end of the tender is entirely out of the way. This pump is used to maintain vacuum of from 10 to 20 in.

When the car is coupled up the other way the lever *B* is thrown into the position shown in fig. 2, which reverses the four-way cock, and therefore changes the two train pipe connections, making the left-hand pipe the steam pipe in each case. When using the return system this is all the change that is necessary, the handles of all the three-way cocks being pointed toward the aisle, when the openings are shown as in fig. 1, except in the case of the last car, when they are pointed toward the engine. The lever *C*, which is connected with the drip cock has three positions. When in the position shown in fig. 1, the drip cock is set for the return system. When it is raised to the intermediate position shown in fig. 3 it is for the direct system, and the condensed water is discharged directly to the tank from each car. For draining the pipes in the car, the lever is thrown into the third position, shown in fig. 4, which gives a free opening for draining all water from the pipes. The positions of the three-way cocks as they should be for the last car, according to the direction in which the car is coupled up, are shown in fig. 5. From the directions for operating this steam heating system we abstract the following: Should a car not heat well, place the lever *C* to "drain" for a few minutes and then back to its former position. The regulating valves must be opened and closed to regulate the heat. When the cars are out of service pull the lever *C* all the way up to "drain." The hose must always be disconnected when the cars are out of service. Under no circumstances must the hose be hung up, but must be allowed to hang down to drain itself; this also applies when using the direct system and to the hose on the rear of the train. When it is necessary for cars to stand out in cold weather, as soon as they have drained themselves, set the three-way cock stems for the next trip and change the position of the reverse lever *B* if necessary. This must be done as the valves when frozen are very hard to move. The temperature must be kept at 65 deg. Fahr. and the ventilators open. In regard to handling the vacuum pump etc., on the locomotive the directions are that the exhaust steam from the pump must always be turned in to heat the train, which is sometimes sufficient in mild weather but generally a pound or two of pressure of live steam is required. In freezing weather about one pound pressure for every car on the train should be used. When a train is cold a pressure of about 30 pounds of steam should be used to heat it up and when the train is warm the instructions should be observed to maintain the heat. The pump should always discharge the condensed water into the tank except when the water in the tank becomes overheated, then discharge to the track by opening the globe valve on the discharge pipe. Ten minutes before the train arrives at its destination all steam must be shut off from the train and the pump allowed to exhaust to the track in order to remove the condensed water from the pipes of the heating system. When a locomotive is out of service and there is danger of freezing, allow a small quantity of steam to blow back from the supply pipe to keep the pump warm.

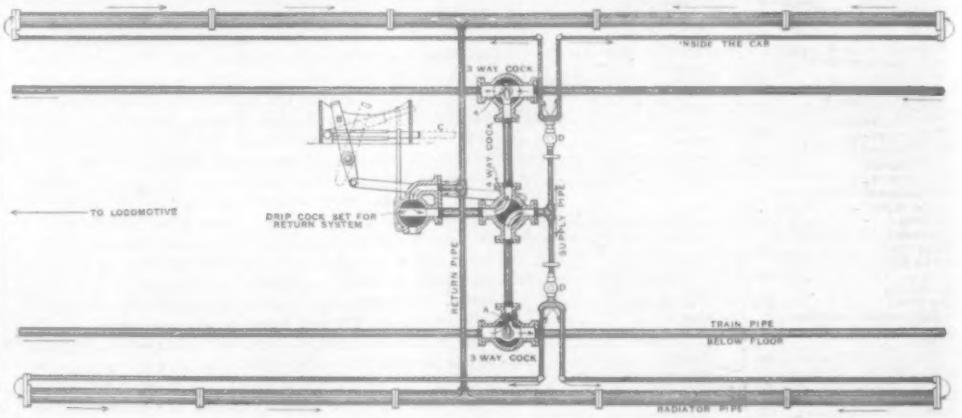


Fig. 1.

The System of Steam Heating Trains on the Pennsylvania Lines.

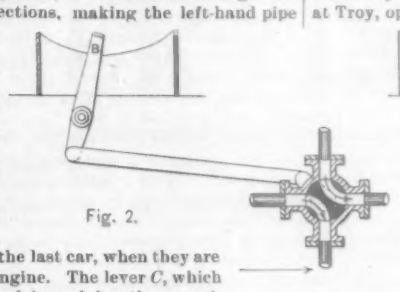


Fig. 2.

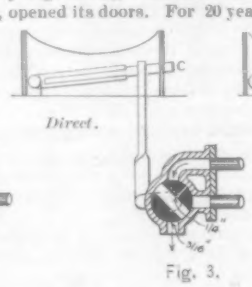


Fig. 3.

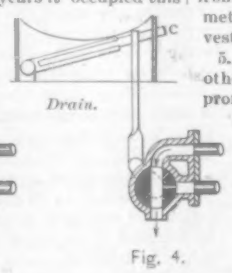


Fig. 4.

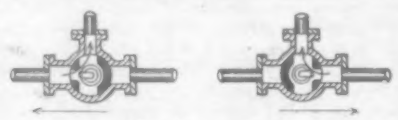


Fig. 5.

How to Elevate the Engineering Profession.

Among the papers read at the last meeting of the American Society of Mechanical Engineers was one that should be of interest to engineers in every department of the profession. It was a topical question by Mr. H. F. J. Porter, entitled "How Can the Present Status of the Engineering Profession Be Improved?"

Engineering, he holds, does not fill the same position in the eyes of the world as the other great professions, and this is not right. The character of the work done and the assumption of responsibilities, greater than in any other profession, demand that it stand second to none. Among its members, too, there is a lack of strict professional etiquette. The reason of all this lies chiefly in the extreme youth of the profession. In 1840 the first distinctly engineering institution in this country, that at Troy, opened its doors. For 20 years it occupied this unique position. The ranks are therefore filled with self-taught men, especially in the lower branches, as the technical schools do not supply specialties until the demand in them is sufficiently great.

The vast differences in the courses of study in the school, he thinks, have also hurt the profession. The public cannot think very highly of a profession which is prepared for so variously, and which even allows men to practice on their own assumed qualifications. Not but what the best of work may be done by a man without a technical education, and the worst by a college graduate, and this only shows more clearly that the degree of an engineering school conveys no idea of the recipient's qualifications. It is clearly the fault of the profession that its personnel is so heterogeneous and the public cannot be blamed for assuming that its members should have some jurisdiction in the matter.

Engineering suffers too in its association with other professions. Architecture is a notable example. The work and skill of the engineer is indispensable here yet he does not get the credit of it.

The remedy for all this does not lie in airing grievances in the scientific press, but should be settled among engineers themselves. A congress is suggested with a standing committee composed of the best representatives in every branch to carry out its results. This would be a vast undertaking, involving an immense amount of preliminary work, but such a congress has already been called to meet next August in connection with the World's Fair. It should consider the subject, which could be formulated by the very representative and able committee which has been appointed to arrange for its sessions.

The congress should endeavor to unify the methods in schools by which a self-taught genius on proving himself capable could obtain a title as well as a technical graduate; it should seek to establish a more perfect balance between the different branches of the professions; should distinctly separate them and require some work of proficiency in each before permission is granted to practice it. If this last could be done, public confidence would be greatly increased, and orders more intelligently placed.

In the discussion that followed, the subject was considered from various points of view.

Prof. R. H. Thurston offered suggestions that would tend to introduce the process of natural selection into engineering.

1. Only those who have natural talent or who spontaneously seek it, should be allowed to enter the profession. Those who lack talent will only lower it. Their sphere of usefulness lies in other things, and the sooner they are helped into them the better.

2. The novice should be trained for at least one department where he can both do it and himself justice. Technical knowledge is not necessary in all departments, and in these many a man can more than compensate by practical talent and natural bent for what he lacks in education.

3. The engineer should practice in the field where he can become distinguished for accurate and extensive knowledge.

4. He should obtain as good a "liberal" education as possible. It may make him lose time, but the best education can extinguish no real talent. A very complete scientific education is recommended. Colleges are beginning to appreciate the value of this and are establishing mechanical and physical laboratories where methods of exact measurement and experimental investigation can be readily taught.

5. Character is the final touchstone. If this is true other things will take care of themselves. As for the profession itself there is nothing to fear. Among its members are classed many of the most learned men of to-day. Its progress in the last thirty years has been most extraordinary. Colleges and schools will continue to do their own part and if it continues to improve as it has done we may be perfectly satisfied.

Mr. John T. Hawkins would divide engineers into two classes. 1st—The "hypothetical" containing such men as Clausius, Regnault, Carnot and Rankine, without whose aid we should still be groping in darkness. They have shown us the why and the wherefore.

2. The creative class who have helped the world to be what it is to-day. Such men as Watt, Whitney and Ericsson are examples. Now technical education tends to develope the hypothetical side too much. If these creative geniuses could have had an education which would develope their own peculiar talent what might the result have been. Why do we take the creative genius and try to force hypothetical ability and, perhaps, spoil both? A Chair of Invention should be established in schools and colleges; there is plenty of material to work upon.

Mr. John H. Cooper emphasizes the necessity of publishing records of all good work. Many men collect data for their own personal use which they selfishly keep to themselves. This is wrong. The much abused Patent Office Reports are often a mine of most valuable data not obtainable elsewhere. They also present a most interesting side of engineering history. They should not be so lightly overlooked.

Mr. Geo. Hill offers the testimony of personal experi-

ence to refute Mr. Porter's argument about the relation of engineering and architecture. The engineer always gets the credit due him. As to overhauling the title of engineers this will be hard to do so long as every man can be his own engineer. As to the status, the Society itself can do something to improve this.

1. The standard of admission should be raised.

2. A grade intermediate between junior and member should be established for those too old to be juniors and still not possessing sufficient knowledge to be members.

3. Let every man be on the alert to help the Society along. As for engineers, if they lead sober, earnest lives, they will help future generations to attain the desired goal.

Settlement of a Railroad Bank.

A few days ago a rather unusual settlement occurred of a railroad bank near Whitehall on the Champlain Division of the Delaware & Hudson Canal Company's system. Although it is not an unusual thing for banks to sett'e seriously during the filling of trestles, and although this is a danger always to be guarded against in such work, the Whitehall case has some peculiar features which make the sketches shown herewith especially interesting.

A trestle about a mile long crossed the submerged meadows forming the shores of South Bay, an arm of Lake Champlain, just north of Whitehall. About 500 ft. of this trestle was filled when the New York & Canada Railroad (now the Champlain Division of the D. & H. system) was built, somewhat over 20 years ago, but the rest of the trestle was maintained until this year, when, in June, the work of filling it was begun.

The first sketch, fig. 1, shows the trestle as it existed before filling was commenced, being a series of ordinary bents 12 ft. apart, resting on piles. A stratum of sediment supporting about 500 lbs. per sq. ft. overlies the hard clay to a depth of 20 to 25 ft. The usual dangers to such structures, resulting from fire and displacement by ice, seemed to render it advisable to complete the embankment and a contract for this, together with other work, was let to the Drake & Stratton Co., Ltd., of New York. Numerous small settlements occured at different points throughout the length of the trestle, the principal amount being, as shown in fig. 2, for a length of about 350 feet approximately, at the middle of the entire length of the trestle. The settlement was taken up by blocking upon the caps of the bents as they went down, until the entire trestle had been filled about Oct. 4, fig. 2 showing the condition of the entire fill then and of all but 350 ft. of it now. In figs. 1 and 2 the condition of the piles is merely conjectured.

On Nov. 5 the 350 ft. of the embankment, to which reference has been made above, settled so that the track was about 2 to 6 ft. under water, as shown in fig. 3, and a temporary crib or pontoon, as shown, was built and the track placed upon it, and trains passed about 22 hours after the accident. Fig. 3 shows sufficiently plainly the nature of the crib used, with bracing across the depression and a bank of cinders to hold it in place, these cinders being deposited before the track was opened for use. Fig. 3 also shows the lifting of the surface of the submerged meadow on both sides of the bank.

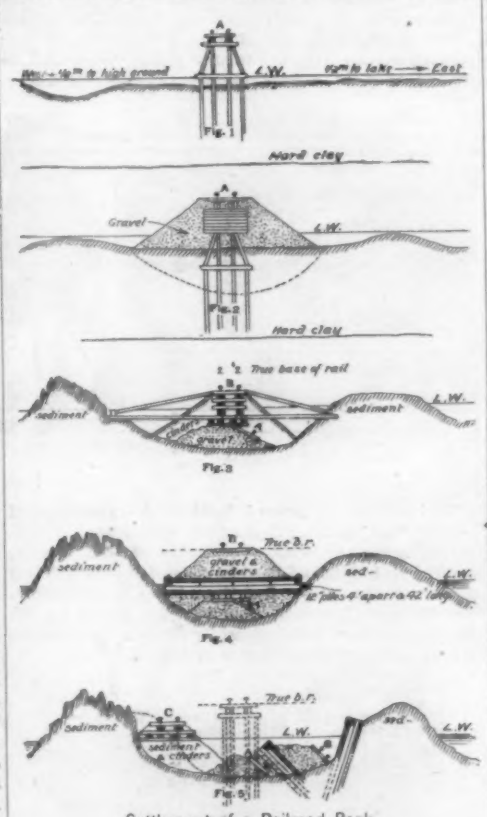
The reconstruction of the bank to its true grade was continued after Nov. 5, and completed Nov. 24, this new bank being built upon a crib of timbers 42 ft. long and 4 ft. apart (see fig. 4), resting upon a solid floor of ties, covered by two tiers of ties laid in opposite direc tions, and the entire crib resting upon gravel, filling in the depression below its lower surface. Fig. 4 indicates the state of affairs Nov. 24.

At about noon of Nov. 26 this crib broke in two, as shown in fig. 5, and settled to the eastward as indicated. The earth wave or "roll" to the west of line was then graded at once for a roadbed and the track was laid upon it for the 350 ft. of break in about 20 hours after the break occurred, and is now operated in this position, as shown in fig. 5, at *C*, and will be so operated until a pile trestle, indicated in broken lines on the sketch, has been completed, when the track will be thrown to its proper line and later a fill will be made upon cribs formed of tree trunks and ties, the material to be used for the fill being furnace cinder.

The surface of the new roadbed shown in fig. 5 was prepared by laying a solid floor of old ties 16 ft. wide, with suitable provision for central bearing on the two tiers of ties composing this floor. Careful soundings of the depth of the sediment upon which the bank was to be built, were made before the work was commenced, and hard clay—shown in the first sketch—was found to exist at almost exactly the same level throughout the whole length of the work and also under the 500 ft. of embankment constructed a number of years ago and which has never shown signs of weakening. It was, therefore, thought safe to build upon this clay and the one explanation of the break which suggests itself is that the clay instead of being a natural underlying stratum of considerable thickness, is a sedimentary layer of varying thickness and that, at the 350 ft. where the break occurred, the thickness of this layer is less than elsewhere, and that the bank at this point has broken through this layer of clay and has settled into the soft material below it. Soundings are now being made to find the exact facts of the case as nearly as may be and to demonstrate what shape a bank takes in settling into sediment of the kind found here.

Notes on English Railroads.

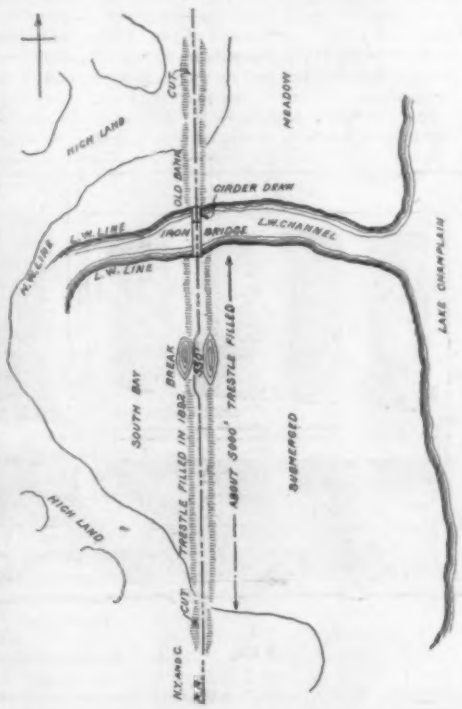
Last month Mr. E. K. Turner, formerly a Division Superintendent of the Fitchburg Railroad, read a paper before the Boston Society of Civil Engineers giving a summing up of his observations of English railroads during a recent visit to that country, and we are permitted to make some extracts from the paper. The paper as a whole is an excellent one. It probably contains little that is new to some of our readers; it contains a great



Settlement of a Railroad Bank.

deal that is not new to most of them, but the facts have not been collected before in so compact a form, and it is especially interesting to see how an old American railroad officer looks at English railroads. Therefore, while we give space to but a small part of Mr. Turner's paper we should be glad to see it published in full in the *Journal* of the Association of Engineering Societies.

Mr. Turner says that the location of many of the English railroads seems to have been determined by considerations other than the wish to get the best possible line,



Settlement of a Railroad Bank.

regarding the natural surface and feature of the country. Often the work cannot be accounted for by strict regard for engineering principles, but the location was doubtless determined by considerations of property damage or by powerful property influence. In the early days, especially, powerful interests were used in Parliament to extort money from the railroad companies in payment of property damages. Public opinion has considerably checked this abuse in later years. Mr. Turner has something to say of the methods of getting charters through Parliament and of the immense cost of those proceedings. It is estimated that between 1856 and 1890 a Parliamentary expenditure of $125,000,000 was made in getting or fighting railroad charters, and during that time only 11,800 miles of railroad was built. He might have added that this feature of railroad building in England has developed a special class of men known as parliamentary barristers, who, however, are not what we know in this country as lobbyists, but who have a lucrative and honest practice before parliamentary committees. Not long ago one of these gentlemen who visited this country displayed such intimate knowledge of railroad matters that a railroad president asked him what his business was. He replied, "I am a parliamentary barrister." Whereupon he was immediately classed by some of those present with several notorious and successful lobbyists in this country, a classification which was very unjust.

Mr. Turner notes the fact that cuts and fills are made wider in England than in this country with great attention to thorough drainage, and that the slopes are trimmed and sodded. This latter feature, he says, can be obtained with little trouble in England because of the moist climate. We would suggest that although it is doubtless easier to get a good turf in England than in this country, nevertheless it would be ultimate economy for many of our railroads to protect their slopes in the same way. It might be practicable also for some of our railroads in regions where broken stone or gravel for ballast must be hauled long distances to try a plan for making burnt clay ballast which Mr. Turner mentions as being used in England. The clay is mixed with sand and then burned in piles or kilns, using old ties for fuel. A similar plan has been tried to considerable extent on Western railroads in the United States where cheap coal can be found and good ballast is expensive, but it does not seem to have been very greatly used. As great a variety in cross section of road is found in England as with us. While in most cases the ties are entirely covered with ballast, in others a greater part of the timber is left exposed to the air. Structures are as a rule heavier and of a more permanent character, and the extensive use of brick in construction is particularly remarked.

In the matter of bridges Mr. Turner thinks that the better class of roads in the United States are not behind the English railroads. The ties there are of pine and Norway fir, sawed, 5 × 10 in., and 8 ft. long, and the greater number are treated chemically, and last from 10 to 15 years, according to tonnage. Doubtless part of this greater durability follows from the prevalent use of chairs. The cost of handling and treating ties is on the Great Northern Railway from 12 to 14 cents apiece. Most of them are imported, and treated at the port where they land, saving at least one handling and the cost of transportation to and from treating plant, which would be necessary for an American road buying ties along its own line. Creosote oil is generally used as a preservative. The London & Northwestern uses 3½ gallons per tie. On the Great Northern the rule is 35 gallons per 50 cu. ft., and the contract price last year was 11s. 6d. per 50 cu. ft. Metal ties have shown little if any saving over timber.

It was observed that the joint bolts are usually placed with the nut inside. The great depth of the rail permits this to be done without danger of the nuts being knocked off by wheel flanges, and in this position they are more convenient for inspection.

The interlocking apparatus was found to be more cumbersome than with us, there being fully one-third more levers for the same movement; although in some of the most recent examples there has been a radical change, bringing about considerable economy in the levers. The expense incurred by the perfect signaling system of the country is very great. On the London & Northwestern there are over 530 men employed in construction and maintenance of signals, besides those engaged in operation. On this system alone, which, by the way, is about 1,800 miles long, there are 1,482 signal cabins, 17,000 signals and 31,500 levers.

Of course the very general separation of grades of streets and railroads attracted Mr. Turner's attention, and he noticed that street crossings at grade are all guarded, the gates being kept closed at all times except when the crossing is being used by teams or people, and interlocked with signals on the line of the railroad. He finds that yards are laid out with more care than has usually been the case in this country, but suggests that in England as here this may be a development rather than due to original foresight. Facing points witches on the main line are avoided wherever possible. Derailing switches are placed wherever there is danger of cars from side tracks getting on the main line, and clearance posts are placed between converging tracks. In many yards there is a light iron frame over the track giving the limit of the size of loads permitted on the open cars.

Track repairs are becoming quite difficult on many roads, especially in the vicinity of large cities on account of the great number of trains passing, and often when aaything more than minor repairs are necessary a new track is put down, the old material being taken out for use on sections of lighter traffic. Hand or push cars are little known among trackmen, it being difficult to use

them between the numerous trains. Maintenance of track in general requires less labor than here, for the same tonnage, because of the more uniform climate. The track of the London & Northwestern is better than any other of equal length that Mr. Turner ever saw; but on most of the large roads while it is very good, it is not better than on many roads in the United States.

The great terminal stations are monuments to the enterprise and foresight of their builders, and large expenditures have been made to get the stations as near as possible to business centres. Country stations, too, are much neater than is usual in the United States, and have generally been built with some regard to architectural effect. Bridges or subways to pass from one side of the track to the other are almost universal.

Mr. Turner's observations on the rolling equipment of the English railroads we shall not reproduce, except to note that he was struck with the great promptness with

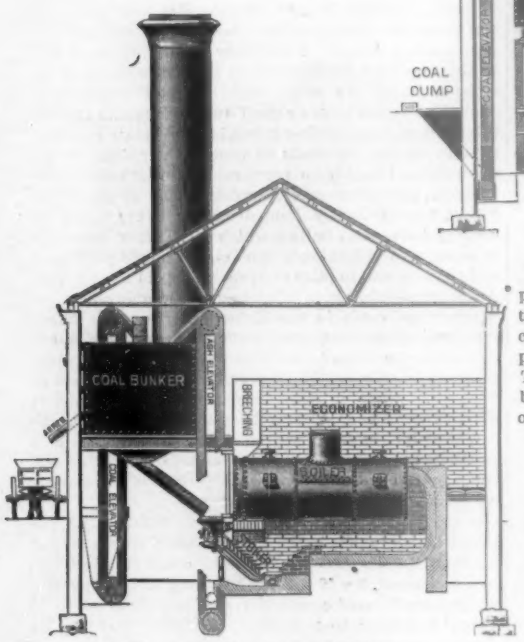


Fig. 1—Section through Stoker.

which passengers were handled, especially at the large terminal stations. Half a minute is generally long enough to empty a long train of passengers. This is made possible, of course, by the numerous side doors. Short distance trains are not usually switched at terminals, but unloaded, reloaded and sent out again with the cars in the same order in which they arrived. These facts permit a very rapid movement of cars in the great stations. Express trains are usually made up in the order of junction points, as cars are dropped and taken up more frequently than with us on a through trun. They are often dropped off without stopping the train.

While express speeds are greater than here, the schedules are not more closely kept. In fact, with the exception of the London & Northwestern, very few of the long run trains are on time. In a journey from London to Glasgow, by the East Coast Line, and from Glasgow to Liverpool, by the Midland, the trains were nowhere less than 30 minutes late, and on the last part of the journey were over one hour late.

Mr. Turner points out the entirely different conditions under which freight is carried in England from those obtaining in this country; as, for instance, the systems of collecting and delivering, the quick handling at stations, the use of small cars, keeping freight separate for separate stations, and the prompt movement of trains. He concludes with a brief examination of the question, why American methods and appliances are not adopted, and is of the opinion that it is not so much a matter of stupidity or want of enterprise on the part of the English railroad managers, as of the adaptability of their present methods to their actual conditions. The rolling stock, for instance, is adapted to existing structures, and could only be changed at great cost. The small cars are suitable for the methods of handling freight in that country. The method of handliug baggage suits the people, and it is undoubtedly more prompt than our own. Steam heating would be a more difficult problem than here, not only because of the greater number of vehicles necessary to equip, but because cars are dropped from trains or taken on at so many different stations.

Finally, he says, no difficulty was experienced in getting permission to examine the roads and everything pertaining to them. On the other hand, every one connected with them, from the manager to the laborer, seemed glad to answer questions, and to give every possible facility for learning their methods and seeing their appliances.

A Modern Boiler Plant.

The accompanying engravings show a strictly modern boiler plant, designed and constructed for Curtis, Davis & Co., Cambridgeport, Mass., by Westinghouse, Church, Kerr & Co., of Boston; the detail work being carried out by William R. Roney, the engineer of their stoker department. The boiler-house was designed to contain every practical element of economy in making steam; though horizontal return-tubular boilers were obliged to be used by certain considerations outside of economy.

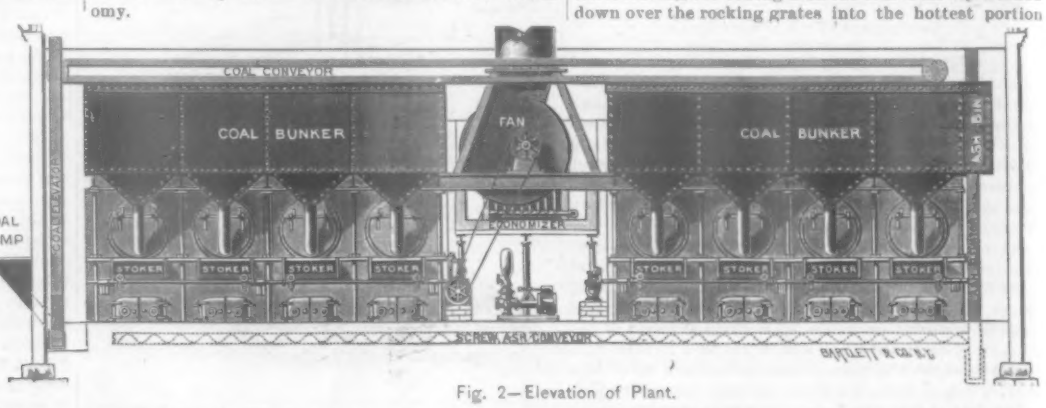


Fig. 2—Elevation of Plant.

The building is of pressed brick with trimmings of pink Milford granite; Hartwell & Richardson, of Boston, being the architects. The roof is of iron trusses, covered with slate and lined on the inside with lath and plaster, for the purpose of preventing condensation. The fire-room floor is of concrete. An annex to the building contains a scale-room for tallying the weight of coal, and a wash-room for the fireman.

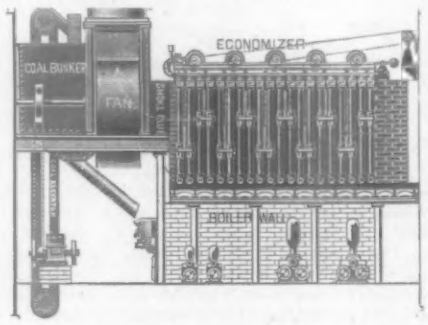


Fig. 4—Section through Economizer.

The plant will, when completed, consist of eight horizontal return-tubular boilers of 125 nom. H. P. each, working at 130 lbs. pressure and arranged in two batteries of four each in either end of the building, the space between being utilized as a pump room. The coal, after being weighed, is dumped on a grating at the end of the boiler-house, shown in the general view. The large lumps are easily broken by the teamster, the grating serving as a screen to reduce the coal to a uniform maximum size. From the grating the coal falls into a bucket elevator carrying it to an overhead conveyor extending the entire length of the boiler-house, which distributes the coal to square iron bunkers having hopper bottoms. The bunkers are supported on iron girders in front of and above the boilers. From the bunkers the coal flows by gravity through swivel spouts to the hoppers of the stokers.

Each boiler is equipped with a Roney mechanical stoker, which furnishes a continuous supply of coal to the furnace at a slow rate of feed; the quantity and distribution being regulated at will by hand-wheel adjustments on the traverse motion. The power to operate the entire battery of stokers is a small engine carried on a bracket at one end of each battery, and driving a slow-moving eccentric shaft. As shown in fig. 1, the grate slopes steeply downward toward the bridge, and the bars, which are transverse, are each made to rock or tilt slightly at regular intervals. The fuel is thus gradually worked down the grate and clinkering is prevented.

The action of the stoker is first to liberate the free gases and partially coke the coal on a dead plate underneath the coking arch, in connection with an indraft of hot air through perforated channels in the firebrick tile. After leaving the coking arch the coal is slowly worked down over the rocking grates into the hottest portion of the fire, and when consumed, the ash and cinder falling on the dumping grates is dropped into the ashpit. Here the ashes fall into a screw conveyer, which carries them to one end of the building where they are elevated into an ash bin and discharged as required through a spout into carts for removal. Thus, from the time the coal is first dumped by the teamster until the ashes are in the cart, practically no manual labor is employed, and the one fireman employed watches and supervises only.

A most interesting portion of the plant is the means of securing controllable draft. The usual expensive chimney stack is replaced by a steel stack 72 inches in diameter, extending 17 feet above the ridge of the roof and showing a total height to the top of only about 85 feet above the ground. This stack is lined with one course of brick merely to prevent rust, and is finished with ornamental top similar to that used on the smokestacks of the Pennsylvania locomotives. The stack is supported on an entablature, which in turn is carried on I-beams over the boiler room. On these I-beams is a large slow-running exhaust fan whose outlet discharges directly up into the bottom of the stack. The waste gases from the furnace pass through a Lowcock economizer, which opens into the suction of the fan. The economizer is carried on iron columns, and the whole system is therfore overhead and out of the way, leaving a clear floor space below. A by-pass damper is provided on each side of the economizer, so that the draft can be direct to the stack in case the economizer is temporarily out of service for repairs and a steam-cone nozzle in the base of the stack may be used when the fan needs overhauling. The usual speed of the fan in ordinary service is from forty to fifty turns per minute, and when driven at the slow speed of eighty turns per minute it is sufficient to cause a draft adequate to the most intense combustion. The motive power of the fan is a 10-horse Westinghouse engine, but running too slowly to develop that power. The draft is automatically controlled by a pressure regulator in the engine steam pipe, so that the speed of the fan varies according to the steam pressure in the boilers. It is claimed that this system is capable of producing a draft pressure equal to that of a a 200-ft. chimney costing ten times as much to build, and in addition possesses the great advantage of absolute flexibility in meeting sudden demands for steam. The fireman is rendered independ

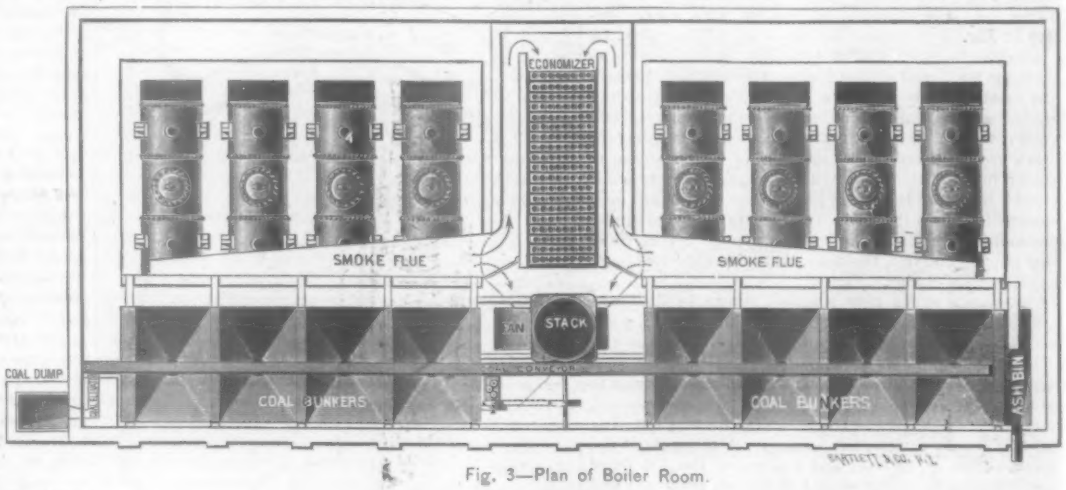


Fig. 3—Plan of Boiler Room.

A MODERN BOILER PLANT.

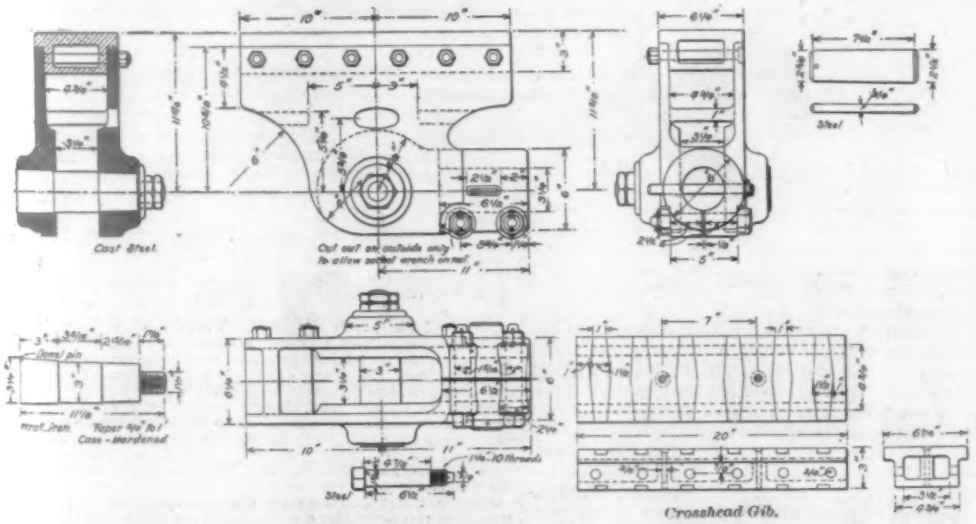
ent of weather conditions, and has nothing to fear from a dirty fire after a long run, or from an emergency which may throw an excessive duty upon his boiler plant without warning. He has the fire at all times wholly within his control, while at the same time the regular service is performed under the most perfect automatic regulation.

The action of the economizer is, of course, to extract all the available heat from the waste gases and return them into the boiler. The temperature of the up-take is about 100 deg., the temperature of the feed water leaving the economizer being upward of 300 deg., and representing an amount of heat saved which would otherwise be wasted up the stack as the only means of producing a natural draft.

The pump room is located between the batteries of boilers underneath the economizer, and contains two duplex pumps of a capacity of 500 gallons per minute each. These pumps are controlled by pressure regulators, and are so connected that while one is furnishing the ordinary elevator service the other is kept slowly moving ready for instantaneous fire service. Their work is alternated daily, and in case of fire both can be concentrated immediately on the fire lines. In the same pump room are double boiler feed pumps, each one adequate to the entire capacity of the plant. All the hot water lines and fittings are of brass, and by passes are provided so that the feed water can be pumped through the economizer, or direct to the boilers in case of repairs to the latter. A further system of a water meter with by-pass valves is so arranged that the feed water can be measured and pumped to either boiler independently, or to any number of boilers, or to the entire battery, at will. With a water meter in the feed line and a pair of scales at the gate, it is proposed that the condition of the entire plant, as to its evaporative duty, shall be daily logged and reported to the office, and any decline of efficiency thereby promptly and practically detected.

Crosshead for Class "F" Engines, Wabash Railroad.

There is in use on the Wabash Road a form of crosshead which we illustrate by the accompanying engravings, which has some especially interesting features, the principal point of interest being the method of fastening the piston rod to the crosshead by means of clamping bolts. The piston rod is perfectly straight without taper or shoulder. The crosshead where the rod enters it is split, as shown in the inverted plan, leaving an opening about ⅛ of an inch wide and the rod is secured by two clamping bolts which are 1⅞ in. in diameter and spaced 3¼ in. apart. When the rod is properly fitted and the bolts screwed up there is probably sufficient holding power in the 6½ in. of contact to make a key unnecessary, but the key shown in the illustration is used as an additional precaution. The important feature of the arrangement is the doing away with the shoulder on the piston rod and thereby very much diminishing the probability of starting a fracture at this point, which, it will



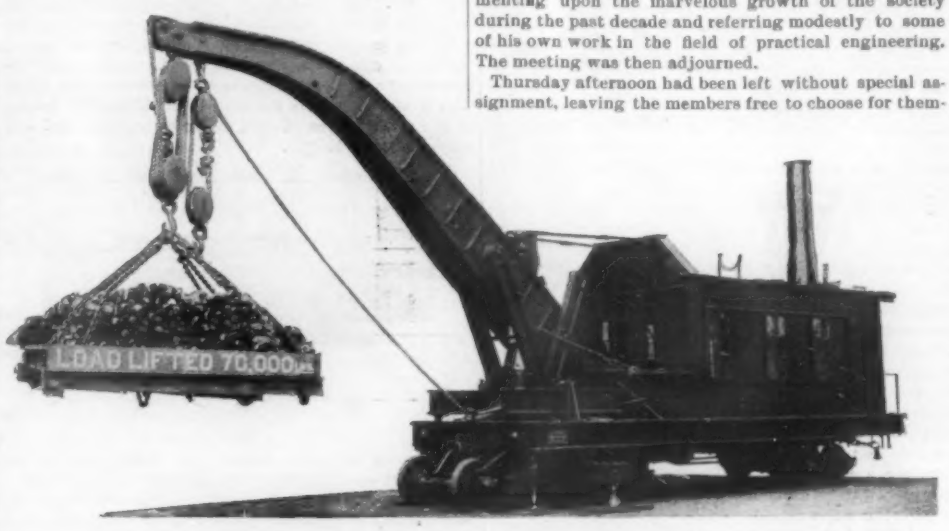
Crosshead for Class F Engines—Wabash Railroad.

be remembered, has been an argument against the use of crossheads of this pattern.

A New Construction and Wrecking Crane.

We illustrate a new design of steam wrecking crane which has just been brought out by the Industrial Works of Bay City, Mich., which is believed to have the largest capacity of any crane so far built which has been mounted for operation upon standard gauge tracks. The Industrial Works has previously built portable cranes of as large nominal capacity as the crane shown, but the increased jib radius, which is 24 ft. in this instance, and the improvement of self propelling and facilities for speedy preparations and operations are recent additions. There is a pair of double engines placed within the cab by which the motions of propelling the car, slewing the jib, and hoisting the load with two speeds are accomplished. The only wood work about this crane is the cab. The gearing is all of steel and the car body is built up of heavy I beams.

Six cranes of this design have been recently built by the Industrial Works, and all of them have been thoroughly tested, demonstrating beyond all question the practicability of using these cranes for the heaviest wrecking and construction work. The machines have shown themselves to be quite equal to their rating wher ever they have been used, as for example on the Great Northern, the Belt Railroad of Chicago, and the Chicago & Eastern Illinois. A superintendent of motive power of one of the above roads said in reference to the crane of this type which they have in use: "We can clear



A New Construction and Wrecking Crane, by the Industrial Works.

wrecks in less than one-fourth of the time we did formerly with our other appliances. We have subjected this machine to some very severe tests, transfering cars and engines bodily, weighing 40 tons, with perfect ease, although the marked capacity of the crane is but 70,000 lbs. We do not see now how we could get along without it."

Three machines of somewhat similar design but of less capacity are in service on the Michigan Central, there are two on the Union Pacific, and one each on the Denver & Rio Grande, Atchison, Topeka & Santa Fe, Chicago & Northwestern, Chicago & Grand Trunk, and many other roads.

The American Society of Mechanical Engineers.

NEW YORK MEETING, CONCLUDED.

The Thursday morning session was opened at 10 o'clock, President Loring in the chair. The session was somewhat remarkable for the almost complete absence of discussion, the papers being presented in comparatively rapid succession with little or no comment. The first on the list was on "Strains in the Rim of Fly-Band-Wheels Produced by Centrifugal Force," by James B. Stanwood. This was followed by one on "An Analysis of the Shaft Governor," by F. M. Rites, which was briefly discussed by Mr. Ball, who directed attention to the fact that the study which had been given to the shaft governor problem had not been so altogether barren of practically valuable results as seemed to be believed.

The paper on "Strains in Lathe Beds" by Geo. W. Bissell, induced Mr. Oberlin Smith to comment on the prevailing light designs of machine tool beds which, he claimed, were too unsubstantial to give the best working results. He pointod out that what was wanted in the beds of such tools was a practical application of the anvil principle, not so much to impart stiffness and strength generally, as to absorb and nullify the effect of vibrations. By means of blackboard sketches, Mr. Smith illustrated a number of ways in which machine tool builders had attempted to secure stiff, strong beds without materially adding to their weight, all of which attempts, according to Mr. Smith, had failed to give good results simply because of the disregard of the anvil principle.

After the reading of other papers, Mr. J. F. Holloway, introduced Mr. Thos. F. Rowland of the Continental Iron Works, of Brooklyn, one of the oldest members of the Society, and builder of the world-famous "Monitor," from the designs of Captain Ericsson. Mr Rowland briefly addressed the meeting, commenting upon the marvelous growth of the society during the past decade and referring modestly to some of his own work in the field of practical engineering. The meeting was then adjourned.

Thursday afternoon had been left without special assignment, leaving the members free to choose for themselves points of interest to be visited. Cards of introduction had been prepared by the Local Committee which gave directions how to reach different points. So far as going in a body is concerned, probably much the largest number availed themselves of the opportunity afforded to visit the Pond Machine Tool Works, at Plainfield, N. J. This establishment has been characterized as a model machine tool works, having been transplanted from Worcester, Mass., to its present location a few years ago. Entirely new buildings were put up, and advantage could thus be taken of the opportunity given to build exactly what was wanted to meet the requirements of such an establishment, and the works are a good example of excellent planning.

Running the entire length of the machine shop is a track by means of which material can be delivered at any desired point in the building. At one end of the shop another track passes off at right angles through a storeroom into the foundry building, a turn table being used to admit of readily transferring the car from one track to the other. Above the track and the spaces on each side of it are two large traveling cranes capable of easily handling 15 tons each. The were built by the Morgan Engineering Co., of Alliance, O., and travel the whole length of the shop, being operated by a three-inch, square, cold-rolled driving shaft, turned at the bearings in the usual way, and made in one piece throughout. It is 504 ft. long, weighs about 7½ tons, and is said to be by far the largest one-length shaft in the world. The next in size is the shaft made by the Morgan company for the gun shops of the United States Government Navy Yard, at Washington, D. C. This is about 480 ft. long. The foundry has another traveling crane, built by the Morgan company, capable of handling 30 tons. The attendant of each crane has full control of its various operations, cross and longitudinal travels, and hoisting and lowering, as well as the starting and stopping of the main driving shaft. In the building of machine tools, each detail is quickly handled by these cranes and placed in proper position. When an ordinary tool is completed, with all its attachments, one of the cranes is brought over it and the whole machine is lifted into a railroad car for transportation. Thus, what generally takes much time and labor is accomplished in a few minutes. For the handling of comparatively light work in the wings of the machine shop there are a number of small traveling cranes worked by hand. In the wings of the foundry, on the other hand, a number of jib cranes are used to handle the lighter stuff. These jib cranes, however, also command the central portion of the foundry floor, so that any small work which may be cast there can be taken care of by them. The cranes are fitted to the roof posts and were made by Ribon & Marsh, of Jersey City, N. J. In case it should be desired every post in the foundry can be provided with a crane of this kind. With the system of cranes and car tracks provided, a casting in the foundry can be delivered to a car on the track which extends into one end of the building, thence rolled into the storeroom in the machine shop building, where the proper entries concerning it can be made, and then continue on into the machine shop proper, where, by means of the turn-table and track, or the traveling cranes; it can be delivered to any desired point. Before leaving the foundry the cast,

ings pass through a cleaning room situated in that end of the foundry building into which the track extends.

In addition to the visit to the Pond works there were several other visits; made by smaller numbers, to the various points enumerated in our issue of last week.

The Thursday evening session began at 8:30 o'clock with a paper on "Hydraulic Reaction Motors," by Professor De Volson Wood, followed immediately by the same author with a paper on "Negative Specific Heat." The latter was briefly discussed by Mr. George Richmond. More particular interest, however, appeared to be centered in a paper by Mr. H. F. J. Porter, entitled "Shall There Be an Overhauling of the Right to Use the Title Engineer?" Long written discussions of this question were presented by Professor Thurston and Messrs. Hawkins, Geo. W. Hill and J. H. Cooper, the discussion being further continued, orally, by Messrs. Oberlin Smith, Durfee, Strong, Rogers and others. The principal points taken up in these discussions were the influence of technical schools on the engineering profession and the character of the training afforded by them. The meeting was adjourned at 10:30 p. m. A collation was served in the house after the session.

The last business session of the week was opened at 10 a. m., Friday, a paper on "The Experimental Determination of the Heat Generated per Candle-Power in Oil Lamps," by Prof. D. S. Jacobus, being the first in order. (See *Railroad Gazette*, Dec. 2.) There being no discussion of this, Mr. R. Van A. Norris presented a short paper giving an account of "Tests of a Pump Receiving Suction Water under Pressure." In discussing this paper, Mr. Faber du Faur pointed out that bringing water under pressure to pumps was a comparatively old practice, having been in use in connection with the Washington aqueduct pump, on the Georgetown side, as far back as 1865. The pump there used, though a steam pump, was operated by water under pressure, water from the same source being pumped through the water cylinders. Part of the water, it will be understood was thus wasted because of its utilization for power. Mr. F. M. Wheeler, in discussing the same paper, directed attention to the fact that while making the necessary pipe connections to a pump was really a very simple matter, it was, at the same time, one in connection with which much ignorance was often shown, and under the circumstances he thought that pump makers might well give it more consideration than they ordinarily did. In illustration of the valve of a suction chamber on the pipe connections of a pump receiving suction water under pressure, he explained, with the aid of blackboard sketches, the arrangement of a circulating pump on board the U. S. S. "Dolphin." This pump received sea water under a head of several feet, and its suction pipe was provided with a suction chamber at the end of a horizontal branch, so that the chamber was in the path of the flowing water. The water level in this suction chamber, as shown by a gauge-glass on the side, was only a few inches above the bottom and fluctuated at each change of stroke of the pump.

The latter, however, worked perfectly noiselessly. Mr. Wheeler explained further that in some cases of which he knew, the suction chamber had been placed at some intermediate point on the suction pipe instead of at one end, so that the water rushed by it and its effect was wholly lost, the pump, as a consequence, pounding. Snifting valves, admitting air into the pump at each stroke, are sometimes used to prevent shocks in pumps, but they constitute simply a pumpmaker's trick, and are not to be commended, reducing the efficiency of a pump. The paper was also briefly discussed by Mr. G. C. Henning, who referred to the prominence of politics in water works engineering, by which many peculiarities of practice might be easily explained.

Mr. W. H. Bristol followed with a paper describing "A New Recording Pressure Gauge for Extremely Low Ranges of Pressure." Mr Bristol exhibited a sample gauge and demonstrated some of its capabilities, showing also to what a variety of purposes it could be successfully applied. The discussion of the paper confined itself to a number of questions, asked by different members, concerning temperature effects and corrections, &c.

Next in order came Prof. R. C. Carpenter's paper on "Comparative Variation in Economy with Change of Load in a Simple and Compound Engine." (See *Railroad Gazette*, Dec. 2.) A written discussion of this paper was presented by Professor Thurston, remarks on it also being made by Messrs. Kerr, Smith and several others.

The paper by Mr. Anthony Victorin, detailing "The Performance of an Overhead Traveling Crane, Operated by a Single Electric Motor," which was given in our last issue, was read in addition to the paper proper. Mr. Victorin gave some data on the performance of another overhead traveling crane at the Pond Machine Tool Works, operated by three electric motors, the experiments recounted having been made only a week previous. This particular crane is of the "Shaw" type, has a span of 41 ft. and a capacity of 15 tons. It is operated by a generator of 30 H. P., speed, 750 r. p. m., built by the United States Electric Lighting Co., of Newark, N. J. The current is transmitted to the crane by means of two No. 00 (B. & S.) hard drawn copper mains strung along the bridge. The operations of the crane are performed by three series of wound motors, built by the United States Electric Lighting Co. The motor for the bridge travel is located at the end of the bridge, and is of 6 H. P. The motors for trolley travel and hoist are located on the trolley, the former having a capacity of 2 H. P., the latter of 8 H. P.; voltage, 220. The bridge rests on a truck on each end, having two double-flanged wheels of 24 in. diameter. The trolley rests on four double-flanged wheels of 14 in. diameter. The hoist motor drives a double drum hoist by means of bevel gears and worms. The hoist has a brake to stop the armature shaft after the current is broken. This brake consists of a pair of solenoids in series with the hoist motor that operates the halves of a friction clutch on the circumference of a drum of 7 in. diameter and 3 in. in width. The hoist is provided with a brake to prevent the load from driving the motor. The speed of the motors is regulated by rheostats, the contact arms of which are operated in unison with the reverse switches by means of three levers in the crane cage. The reversing of the motors is accomplished by a reversing switch, which reverses the direction of the current in the armature. Tabulated results of the performance of this crane were given and discussed at some length.

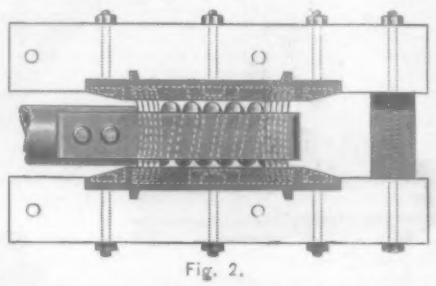


Fig. 2.

Following this came a paper on "A New Graduating Steam Radiator," by Mr. John T. Hawkins. In the discussion, the question of air binding in radiators was prominently mentioned, and attention was directed to some experiments now being made at the Massachusetts Institute of Technology as to the best methods of getting air out of radiators. Mr. Walworth, in connection with the same subject, described 10 various contrivances, more or less interesting, which had been brought out and used for regulating the heat given off by radiators.

The next paper was by Prof. C. H. Peabody, and described "Tests on the Triple Engine at the Massachusetts Institute of Technology." (See *Railroad Gazette*, Dec. 2.) The paper was discussed by Professors Thurston and Jacobus, the principal point raised by the latter being that the tests mention were of rather too short duration to be conclusive.

At the concluding portion of the session two topical queries were taken up for discussion, the first being entitled "Is the Weaving Shed Design the Best Form of Construction for a Machine Shop?" A printed contribution to the subject had been prepared by Prof. John E. Sweet and was presented, Mr. C. J. H. Woodbury following with an account principally devoted to different forms of shop floors. Mr. Holloway also described a floor put down in a western shop, and which he thought worthy of special mention. In the ordinary floor construction of ground sleepers with plank above dry rot is quickly engendered. In the particular floor under consideration it was proposed to utilize the principle of wood paving. If the latter would successfully withstand the wear and tear of street traffic it would surely, it was argued, prove a good shop flooring. Accordingly the ground was covered with a layer of sand, and on this were laid 1-in. tarred boards. On these again, but at right angles, were laid other 1-in. tarred boards, and on top of these, finally, were laid the regular wood paving blocks, treated in the ordinary way with tar filling, etc. This floor, Mr. Holloway stated, fulfilled all the expectations which were entertained of it, proving itself a practically ideal shop floor.

The second topic was entitled "To What Extent Can the Milling Machine Replace the Planer?" A printed reply to this was presented by Mr. W. S. Rogers. (*See Railroad Gazette, Dec.* 2.) The question was briefly discussed also by Mr. Oberlin Smith and Mr. G. C. Henning, the latter exhibiting an English make of milling cutter or which a number of advantages were claimed.

The Hinson Drawbar Attachment.

We illustrate one of the latest forms of the vertical plane coupler, which is known as the "Perfected" coupler, together with the Hinson drawbar attachment. The coupler is shown by fig. 1, in connection with the arrangement of wrought iron followers and draft spring which has been in use for some time with satisfactory results. It will be seen that by means of the intermediate projections on the draft castings the strain is taken by both follower plates as soon as the draft spring is compressed a reasonable distance in either direction. In the later form of draft gear shown in fig. 2, the wrought iron follower plates are each replaced by four pieces of spring steel of from 1½ to ⅝ in. in thickness, which gives greater strength and flexibility. The castings are of malleable iron and are the same as recently used, but the bottom of each is formed by a separate piece which is intended to facilitate putting the spring and followers in place and which is secured by two of the bolts by which the castings are fastened to the draft timbers.

There is a device in this coupler, not shown in the illustration, by means of which the coupler unlocks if drawn two inches beyond its intended range of motion.

This coupler is sold by the Perfected Car Coupler Co., and Hinson Drawbar Attachment Co., "Rookery," Chicago.

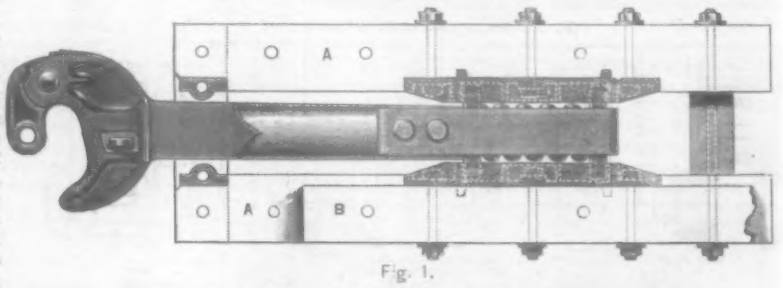


Fig. 1.

Perfected Car Coupler and Hinson Drawbar Attachment.

The Illinois Central's Title Settled in the "Lake Front" Cases.

The United States Supreme Court on Dec. 5 affirmed the judgment of the Circuit Court in the Chicago lake front cases. The railroad company is confirmed in substantially all its property which is improved, but the unimproved property, the submerged land which the road had hoped to possess, is decided to belong to the state, and the legislature has no power to transfer it to private parties. The case arose over suits between the Illinois Central Railroad and the people of the State of Illinois, the city of Chicago and the United States, involving title to submerged lands along about one and four-fifths miles of the water front of the most valuable part of the harbor of Chicago, the value of the property in litigation being estimated at from $6,000,000 (according to the figure given in court by Mr. Jewett, of the Illinois Central), to $70,000,000, the largest estimate made. About 1,050 acres were in dispute.

By virtue of an act of the Illinois Legislature passed in 1869, when the city of Chicago was small, the Illinois Central received certain rights in the water front of Lake Michigan at Chicago for railroad purposes, and, it was held by the road, the right also to the water front itself. Acting upon its claim to riparian ownership of the water front, the road built cribs and other works, and announced its intention to construct immense piers and wharves far out into the lake (the water being now 9 to 30 ft. in depth). Suit was brought on behalf of the city of Chicago and of the State of Illinois to restrain the road from encroaching on the water front, which was held by the city and the state to be public and not private property. It was asserted in behalf of the public authorities that the act of 1869 did not constitute a grant of title to the land in litigation; that there was no contract made by the grant; that such rights as had been granted had been repealed by a law enacted in 1873; that if a grant of the water front had been actually attempted to be made by the act of 1869 it was void, for the reason that the water front was public property, dedicated to public uses, and that the act was therefore unconstitutional. Certain other points, mostly of a technical character, were also raised.

The case came up before the United States Circuit Court, and Justice Harlan, sitting as circuit judge, delivered an opinion, of which the general effect was to confirm the Illinois Central in its title to ground along the lake front already occupied by it for railroad purposes, and to land it had reclaimed and to piers previously erected, but was against the road on the question of title to the submerged lands along the present water front, the decision holding that this was public property, and that whatever rights had been granted therein had been subsequently repealed. It was held that the legislatures are incompetent to grant powers over navigable waters, which interfere with freedom of navigation and state, municipal and national control over it, and that any act of the legislature granting such rights is invalid.

The order of the Court directs a modification of the decree below, so far as relates to certain piers heretofore constructed by the road, the Supreme Court directing that a judicial investion be made to determine whether or no piers 1, 2 and 3, near Chicago River, and the piers between Twelfth and Sixteenth Streets are or are not within navigable waters. If within navigable waters, the railroad company is divested of its title to these piers.

Justice Shiras, in an oral dissent, which he stated would be reinforced by a written dissent later, said that in his opinion the grant of the state to the Illinois Central was a valid grant, which constituted a contract between the railroad and the state, and one which could not be taken away by a subsequent arbitrary act of the legislature. He held that the state could regulate the use of the riparian waters by the railroad company so as to protect the public interests. If it desired to take the control of the harbor, he declared that the proper method was by bill of condemnation, by which the state could exercise its right of eminent domain and take the property for public use. The Chief Justice, having been counsel in the court below, and Justice Blatchford, being a stockholder in the Illinois Central, did not take any part in the consideration or decision of these cases. Justices Brown and Gray joined Justice Shiras in dissenting. The four justices in favor of the city are Justices Field, Harlan, Lamar and Brewer.

Bridge Accident in West Virginia.

On Saturday last a heavy iron girder of a bridge in course of construction for the Norfolk & Western Railroad over Pigeon River in West Virginia fell, letting the remainder of the bridge and a construction train fall into the river. One man was killed, and trains badly delayed. The Phœnix Bridge Company was doing the work.

The Worthington Sectional Water-Tube Boiler.

This boiler belongs to the sectional class, in which the water is contained in small tubes and chambers, designed to secure the important requisites of safety, durability, accessibility and high evaporative efficiency. This boiler is made by the New York Steam Power Co., of 30 Cortlandt street, New York, who claim that it is constructed of material of superior quality, and with a degree of mechanical excellence equal to that employed in the manufacture of first-class machinery; hence very high pressure may be carried with absolute safety and entire freedom from leakage. It is designed to be economical of space, and at the same time to be of liberal proportions in grate area and heating surface, while the interior of the entire construction, in every part and detail, is readily accessible from the outside, for examination, cleaning or repair. The furnace extends under the entire boiler, and is of proper height to permit the use of any kind of fuel.

As shown in the illustrations, the tubes are arranged in transversely-inclined series of several tubes per section.

Every tube employed is a lap welded boiler tube, and is straight, and every tube and connection is expanded, and there are no screwed joints or connections.

The heating surfaces and waterways are so arranged that it is claimed, that the movement of the water contained in the boiler is constant and rapid. Its course is as follows: From the steam-and-water drum located above

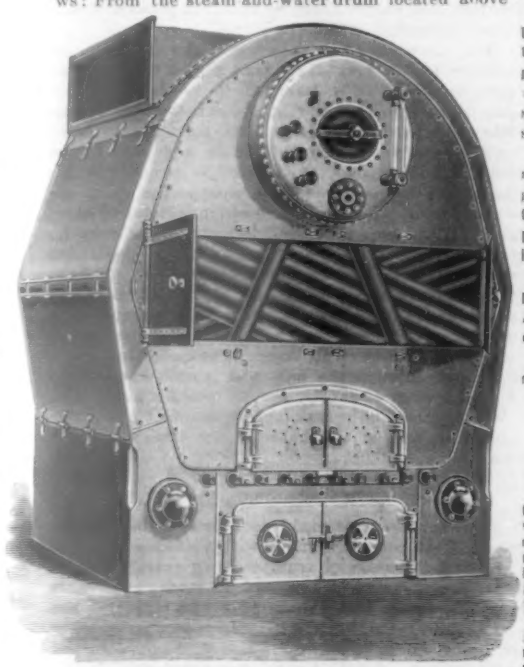


Fig. 1—Front Elevation.

the tubes, into which water is fed, it descends the water legs, four in number, placed outside the furnace, to the water-and-mud drums, at the base; thence it passes via the tube connections into the lower series of headers; thence through the tubes, over the fire, into the upper series of headers; thence via the tube connections into the steam-and-water drum again (from whence it started). The headers for tubes are made of steel or iron according to service required. They are placed closely together side by side, forming complete side walls to the furnace and affording a limited amount of effective heating surface. Outside the furnace, opposite each end of each tube, a hand-hole of proper size to admit a tube or a tube-expander, is provided and fitted with a cap held to place with a crossbar and bolt. This cap is accurately faced and ground to a tight joint. The caps are exposed upon opening the side doors below mentioned and can be examined or tightened if necessary. Upon removal of a cap the internal condition of a tube is open to inspection, to cleaning, or, in case of leakage in the expanded joint, to re-expansion. And in case of accident to a tube or depreciation due to long usage a new tube can be substituted with but little trouble and delay. Each end of each mud drum is also provided with a removable cap accessible from the outside.

The furnace is lined with fire brick, and the only other brick work required to erect a stationary boiler consists of two foundation walls of proper depth, rising about 12 in. above floor level.

The sections, drums, etc., when connected and ready for pressure are incased with heavy sheet iron, lined with asbestos and magnesia. The casing is bolted to a wrought iron angle or channel bar frame. Hinged doors are provided on front and rear, and on both sides opposite upper and lower headers, affording access to interior of boiler, and to tube ends as before described.

These boilers are proportioned and rated for generating power on the basis of the Centennial standard—namely, the evaporation of 30 lbs. of water, at 70 lbs. pressure, from temperature of 100 deg.—to be one horse power. Said duty to be accomplished with a consumption of anthracite coal of good quality at the rate of 12 lbs. per hour per square foot of grate with good natural draft. It is claimed that the actual steaming efficiency, and also the ultimate capacity, is largely in excess of the rating on above basis.

The following is a brief statement of the principal features of superiority claimed for this form of boiler. In a water tube boiler the elements which insure safety are numerous. Firstly, in the strength of the parts which are combined; secondly, in the reduced areas exposed to rupture; thirdly, in the distribution of the total strain. It follows that a boiler composed chiefly of boiler tubes, which, when of standard make and perfection, possess an enormous resisting power, as against explosion, is far advanced in the direction of safety in comparison with any type of boiler in which tubular area is a mere fraction of the total area subjected to explosive force. In this boiler the above mentioned factors of safety are all present. Each section of tubes and headers is tested under 500 lbs. hydrostatic pressure at the maker's works, and is known to be sound and perfect before being incorporated in a boiler. The main steam drum is made of open hearth homogeneous flange steel plate, having a tensile strength of not less than 60,000 lbs. per square inch of sectional area, and possessing sufficient homogeneousness, toughness and ductility to show a contraction of area not less than 50 per cent. The plate employed is of proper thickness to enable the boiler (under government standard of pressure allowable) to carry a working pressure of 250 lbs. per square inch.

The water circulation is natural and positive as it is passed through the tubes and exposed to the action of the fire in a steady and continuous flow. The steam generated is quickly conducted to the drum, and in consequence of the ample disengaging surface provided, separates from the water without turbulence, and is dry steam ready for use.

The system of cross tubes employed concentrates results in the heating surface without contracting the grate area. Hence, it is claimed, that the capacity of the boiler in horse power per cubic foot of space occupied is greater than is afforded by any other boiler now known to the market, "pipe" boilers excepted.

Owing to its sectional character it can be delivered in places wholly inaccessible to any other desirable boiler. A boiler of 200 H. P. can be passed through a 4 × 4-ft. doorway, window or sidewalk opening.

A boiler of 100 H. P. occupies a floor place 7½ ft. square, and is less than 10 ft. high.

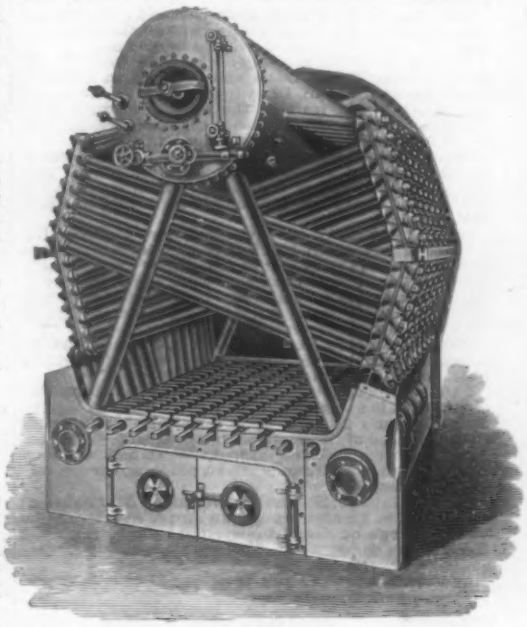


Fig. 2—*Front Elevation with Outside Casing Removed.*

The Worthington Sectional Steam Boiler.

Train Accidents in the United States in October.

COLLISIONS.

REAR.

1st, on Lehigh Valley, near Lansdown, N. J., a coal train which had waited on a siding for a fast freight which was run in two sections moved out after the passage of the first section, and was run into by the second, making a considerable wreck which was soon after run into by another freight passing on the adjoining main track. One engineer was killed and a brakeman injured.

1st, on Central of New Jersey near Somerville, N. J., a Lehigh Valley freight train which was running on this road in consequence of a freight collision on its own road, ran into the rear of a Central freight, wrecking the engine and 6 cars. Several cars of cattle were ditched, and the conductor of the train was severely gored by a bull which escaped from one of the cars.

8th, on Pittsburgh, Akron & Western, at Bluffton, O., a freight train which had stopped at the station was run into at the rear by a following freight, and a passenger car, used as a caboose, was wrecked. A brakeman was killed.

11th, on Louisville, New Albany & Chicago, near Salem, Ind., a freight train ran into a coal car which had run out from a side track, damaging the engine and injuring the conductor. It is said that the car was maliciously released.

11th, on Manhattan Elevated (Sixth avenue line) near 125th street, New York City, a passenger train ran into the rear of a preceding passenger train, slightly damaging the cars and injuring about 15 passengers, most of them slightly. It appears that the foremost train had been accidentally stopped and that the following train was running too close to it.

11th, on East Tennessee, Virginia & Georgia, at Longview, Ga., a freight train standing at the station was run into at the rear by a following freight wrecking the caboose and 2 cars. One conductor was injured.

15th, 4 a. m., on Texas & Pacific, near Wills Point, Tex., a freight train running at high speed was run into at the rear by a following freight, wrecking the engine and 3 or four cars. Several of the cars were loaded with valuable horses and cattle, and one contained a large quantity of oil. The wreck took fire from a lamp in one of the stock cars and all the combustible portion of it was burned up, including 25 animals. Several of the attendants were injured. There was a dense fog at the time.

16th, 5 a. m., on Chicago, Rock Island & Pacific, at Ottawa, Ill., a freight train which had stopped to take water was run into at the rear by a fast freight, and the engine and 8 cars were wrecked. The engineer was fatally injured by jumping.

16th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Bradford Junction, O., a passenger train ran into an empty engine between the station and the round house, doing slight damage; the empty engine was preceded by two others, all of them being bound from the round house to the station, and these in turn were run into. The injuries to passengers and employés were all slight.

18th, on Philadelphia & Reading, at Weston, N. J., a freight train standing at the station was run into at the rear by a following freight, wrecking several cars. One brakeman was killed.

19th, on Fitchburg road, at Watertown, Mass., a freight train standing at the station was run into at the rear by a car being pushed by a locomotive, badly damaging several cars. Two men in charge of horses were injured. It is said that the flagman of the standing train did not go back far enough.

20th, 11 p. m., on New York, New Haven & Hartford, at Greenwich, Conn., a freight train standing at the station was run into at the rear by a following freight and the engine and 6 cars were thrown down a bank; a brakeman was injured.

26th, on Concord & Montreal, near East Concord, N. H., a freight train descending a grade broke in two and the rear portion afterward ran into the front one derailing a dozen cars; a brakeman was injured.

27th, on Philadelphia & Reading, near Barnesville, Pa., a coal train broke in two and the detached (rear) section afterward collided with another train, wrecking 10 cars; a brakeman was badly injured.

And 29 others on 21 roads involving 5 passenger and 41 freight and other trains.

BUTTING.

3d, on Northern Pacific, at North Town Junction, Minn., a passenger train ran into the head of an extra freight, which was wrongfully on the main track, killing a fireman and an engineer and injuring 2 employés and 5 passengers. Both trains were running at considerable speed and the engines and several cars were badly wrecked. The conductor and engineer of the freight forgot about the passenger train. It is said that they had been on duty 30 hours. Both were arrested, as was the superintendent also. The latter was fined $50 for permitting overwork.

7th, on Louisville, New Orleans & Texas, near Baton Rouge, La., a passenger train ran over a misplaced switch and into the head of another passenger train standing on the side track badly damaging both engines. One fireman was killed.

7th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Xenia, O., butting collision between a passenger and a freight train, doing considerable damage and causing the death of an engineer and fireman. Several passengers were injured. It is said that the freight had become uncontrollable while switching in a yard on a steep grade, and that it ran some distance out on the main track in consequence of the absence of the brakemen who were on other portions of the train.

7th, on Alabama Great Southern, near Hull, Ala., butting collison between an engine and a work train causing the injury of 1 engineer.

10th, on Denver & Rio Grande, at Spike Buck, Col., butting collision between a passenger and a freight train, injuring 4 train men. It is said that an operator's mistake was the cause of the accident.

14th, 6 a. m., on New London Northern, near New London, Conn., butting collision of freight trains, making a bad wreck and killing 5 men in charge of horses in the foremost car of one of the trains. It is said that the operator at Norwich deceived the train despatcher by telling him that one of these trains had not passed, when, in fact, the operator had been asleep for some time and was unable to give correct information.

16th, on Baltimore & Ohio, near Auburn, Ind, butting collision of freight trains in a dense fog resulted in the wreck of both trains and several cars, and the injury of a brakeman and a fireman. It is said that one of the trains had gone a short distance beyond a side track at which it had been ordered to stop.

21st, on Toledo, St. Louis & Kansas City, at Hardin, Ill., a butting collision of freight trains wrecked one engine and several cars, and badly damaged the other engine. One brakeman was fatally injured. It is said that one of the trains disregarded a meeting order.

23d, on Philadelphia & Reading, near Allenwood, Pa., a butting collision between freight trains, one of which was running very slowly and the other very fast, wrecked both engines and a dozen cars. Three trainmen were injured.

23d, on Wisconsin Central, near St. Paul, Minn., butting collision between a northbound train carrying militia and horses, and a southbound stock train. Both trains were running at considerable speed. The wreck took fire from a lamp in a baggage car and most of it was burned up. Several soldiers were injured. It is said that the conductor and engineer of the southbound train disregarded a meeting order which they had received. Both trains were equipped with airbrakes, and the speed had been greatly reduced before they struck each other.

24th, 9 a. m., on Philadelphia & Reading, near West Manayunk, Pa., a butting collision between a southbound passenger train running on the northbound track and a northbound freight train, badly wrecking both trains and resulted in the death of 5 passengers and 3 trainmen, 12 passengers and 6 trainmen were injured. The station agent at Pencoyd had received an order to hold the freight train until the passenger arrived at that station, but he subsequently received another tele-

graphic order concerning some cars to be taken on by the freight, and wrongfully assumed that the first order was thereby annulled.

24th, on Milwaukee & Northern, near Plymouth, Wis., butting collision between a freight and a work train; 2 employés were killed and 6 injured.

28th, on Cleveland, Cincinnati, Chicago & St. Louis, at Terre Haute, Ind., butting collision between freight trains on the bridge over the Wabash River, breaking the bridge and precipitating both engines and 8 cars of coal and live stock into the river. One engineer was killed and a brakeman injured.

29th, 11 p. m., on Southern Pacific, at Pantano, Ariz., an empty engine collided with a work train, causing the death of 1 engineer. It is said that an operator failed to hold one of the trains.

And 7 others on 7 roads, involving 2 passenger and 12 freight and other trains.

CROSSING AND MISCELLANEOUS.

5th, on Fitchburg road, at Littleton, Mass., an eastbound freight train, standing on the westbound track, was run into by a westbound freight, 4 cars being demolished and 1 engineer injured. It is said that the obscuration of a signal by smoke was the cause of the accident.

8th, on Chicago & Northwestern, near Rochester, Minn., a car of passengers being switched from one train to another was run through a misplaced switch and into a moving freight train; 2 passengers injured.

12th, on Union Pacific, near El Moro, Col., collision of freight trains in the yard, injuring an engineer, conductor and 1 brakeman. There was a blinding snowstorm at the time.

18th, on Lehigh Valley, at Sayre, Pa., a collision of freight trains resulted in the death of an engineer and fireman.

19th, on Union Pacific, near Glenns Ferry, Idaho, a collision of freight trains wrecked one engine and several cars, and caused the death of a brakeman.

21st, 9 p. m., at the crossing of the Cleveland, Cincinnati, Chicago & St. Louis and the Indiana & Illinois Southern, at Marshall, Ill., a freight train of the former ran into a gravel train of the latter, overturning the engine and killing the roadmaster, who was riding upon it. A brakeman on the gravel train was injured.

23d, at the crossing of the Chicago, Rock Island & Pacific and the Burlington & Missouri River, near Reynolds, Neb., a stock train of the former road ran into a freight of the latter, wrecking 10 cars. Two trainmen were injured.

24th, on Chicago & Northwestern, near Palatine, Ill., a gravel train was run into by a freight which started to pull out of a side track just as the gravel train passed, and a conductor and brakeman were killed; the engineer of the freight was injured. It is said that a preceding passenger train carried signals for the gravel train and that these were disregarded.

25th, on Southern Pacific, at Davis, Cal., collision between an empty engine and a freight train; 1 engineer killed and 2 other employés injured.

28th, on Philadelphia & Reading, near Birdsboro, Pa., a freight train switching at the station was run into by a northbound freight approaching at considerable speed, and one of the engines was overturned, the engineer and fireman being injured. The wreck was soon run into by a southbound freight, piling up several cars in a bad wreck.

29th, on Chicago, St. Paul, Minneapolis & Omaha, at Sioux City, S. D., a passenger ran into a freight engine which, in consequence of a misplaced switch, ran upon the main track just as the passenger was passing. One engineer was injured.

And 20 others on 14 roads, involving 10 passenger and 26 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

6th, on Missouri Pacific, near Chico, Kan., a freight train was wrecked by running upon a burning bridge and 13 cars were burned up. The engineer and fireman were killed and another employé injured.

6th, on Louisville, New Orleans and Texas, near Hays, Miss., a passenger train broke through a trestle bridge and 3 passenger and 1 baggage car were burned up; the fireman was killed and the engineer injured. It is said that the trestle had been weakened by fire.

6th, on Louisville & Nashville, near Cullman, Ala., a work train was derailed at a switch which was insecure in consequence of the breakage of a bolt in the switch-bar. A brakeman fell from a car and was killed.

10th, on Kansas City, St. Joseph & Council Bluffs near St. Joseph, Mo., a stock train ran upon a burning bridge and was badly wrecked. Most of the wreck was burned up.

23d, 11 p. m. on Chicago & Eastern Illinois, at Forty-ninth street, Chicago, Ill., a passenger train was derailed by a defective switch and 1 car containing 50 passengers was overturned. One passenger was killed and the conductor and 10 others injured.

25th, 3 a. m., on St. Louis & San Francisco, near Phillipsburgh, Mo., a passenger train was derailed by a broken rail and 4 cars overturned. Two trainmen were killed and 14 passengers injured.

And 10 others on 10 roads involving 5 passenger and 5 freight and other trains.

DEFECTS OF EQUIPMENT.

18th, on Houston & Texas Central, near Prairie View, Tex., several platform cars in the front part of a freight train were wrecked by the sudden stoppage of the train in consequence of the application of the air-brake caused by the pulling out of a drawbar.

And 8 others on 5 roads, involving 1 passenger and 9 freight and other trains.

NEGLIGENCE IN OPERATING.

3rd, on Philadelphia & Reading at Steelton, Pa., a passenger train was derailed by a misplaced switch and the conductor injured.

6th, on New York, Lake Erie & Western, near Binghamton, N. Y., a freight train was derailed by a misplaced switch and blocked both tracks, and 6 employés were injured. A wrecking train which was sent to clear the track ran into the wreck at considerable speed, and a workman who jumped off the engine just before it struck was killed.

7th, on Chicago & Atlanta, at Hammond, Ind., a Wabash passenger train ran over a misplaced switch and was derailed, making a considerable wreck and injuring 3 employés and 3 passengers.

21st, on Chicago & Erie, at Leiters, Ind., a Wells-Fargo express train was derailed by a misplaced switch and the engineer and fireman were badly injured.

And 13 others on 10 roads involving 5 passenger and 8 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

4th, on Southern Pacific, at Verdi, Cal., a passenger train was derailed by a cow and the fireman badly injured.

9th, on Atchison, Topeka & Santa Fe, near Pueblo, Col., a freight train was derailed by a cow, on a trestle, making a very bad wreck and killing 3 trainmen.

14th, on Houston & Texas Central, near Hearne, Tex., a freight train was derailed by running over a yoke of oxen, and the engine and several cars were thrown down a bank. The wreck took fire and a brakeman was fatally burned. A man in charge of horses was injured.

14th, on Southern Pacific, near Placerville, Cal., a passenger train was derailed by running over a cow, and the engine was overturned. The engineer and fireman were badly injured.

16th, on Kansas City, Fort Scott & Memphis, near West Plains, Mo., a freight train was derailed by running over a cow, and the engine and 2 cars were ditched; engineer and 1 brakeman badly injured.

29th, on Newport News & Mississippi Valley, near Gordon, Ky., a freight train was derailed by running over a cow, and the engine and 9 cars were wrecked. The engineer and firemen were killed and a brakeman injured.

And 4 others on 4 roads, involving 2 passenger and 2 other trains.

UNEXPLAINED.

1st, on Chicago & Northwestern, near Centreville, S. D., a passenger train was derailed and 2 cars overturned; conductor and brakeman injured.

3d, on San Antonio & Aransas Pass, near Moulton, Tex., a freight train broke through a bridge and 17 cars of cattle were wrecked. The fireman was killed.

4th, on Texas Western, near Zimby, Tex., a car in a passenger train was derailed and overturned and 1 passenger injured.

Fig. 1.

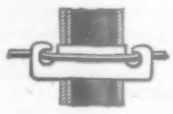


Fig. 2.

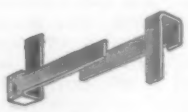


Fig. 3.

6th, on Louisville & Nashville, near Hanceville, Ala., a freight train was derailed and 10 cars wrecked. One brakeman was killed.

10th, on Charleston, Sumter & Northern, at Bennettsville, S. C., 2 cars in a freight train were derailed, killing 3 and injuring 3 trainmen.

10th, on Philadelphia & Reading, at St. Nicholas, Pa., several cars of a freight train were derailed and wrecked and a trainman was killed.

16th, on New York, Lake Erie & Western, at Stevens Point, Pa., a freight train was derailed, making a bad wreck and killing a brakeman.

22d, on Union Pacific, at Havens, Neb., a freight train was derailed, making a bad wreck. It is said that 3 tramps were killed.

25th, on Union Pacific, near Barela, Col. a freight train was derailed and

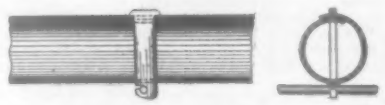


Fig. 4.

International Steel Fence Post.

6 cars of sheep overturned, making a bad wreck; 3 train men were injured.

27th, on Baltimore & Ohio, near Avalon, Md., a car in a freight train was derailed and a brakeman injured.

28th, on Pennsylvania road, near Birmingham, Pa., a freight train was derailed and a brakeman killed.

31st, on Norfolk & Western, near Disputanta, Va., a freight train was derailed and 14 cars wrecked. A tramp was killed and 3 trainmen injured.

And 30 others on 27 roads involving 7 passenger and 24 freight and other trains.

OTHER ACCIDENTS.

13th, on Michigan Central, near Sterling, Mich., the locomotive of a freight train was badly damaged by the breaking of both parallel rods, the engineer and fireman being injured. It is said that the rods broke just as the engine had been reversed, while running at considerable speed down hill.

26th, on Kansas City, Memphis & Birmingham at Palos, Ala., the engine of a freight train was wrecked by the explosion of its boiler, and the engineer and fireman killed; the conductor was injured. The engine was four years old. No defect was discovered in the boiler.

27th, on Manhattan Elevated, at City Hall station, New York City, a passenger train approaching the station at too high speed ran into the buffer-block at the end of the track, damaging the tank of the engine and the platform of the first car; 2 passengers were injured.

And 3 others on 3 roads involving 3 passenger trains.

A summary will be found in another column.

Public Supply of Hot Water.

Twenty hot water fountains have been erected in various parts of Paris for public supply. By dropping a five-centime piece in the slot and pressing a button, one can draw a pail of hot water at any time. The water is heated after the money is dropped into the slot, by gas which is ignited by a lamp constantly burning. The heating surface is sufficient to heat the water during its passage to a temperature of 149° F. The temperature will be greater however if water is drawn at very short intervals.

A New Steel Fence Post.

We illustrate the steel post which is now being manufactured by the International Steel Post Co., Chicago, and which has several novel and valuable features. The general form and appearance of the post is show in fig. 1. The post is formed of a sheet of No. 16 steel cut taper. The sheet is sheared to size and the holes for the keys are then punched at one operation by a multiple punch. It is then put through a special machine of ingenious design, from which it is turned out in the shape shown by fig. 1. The capacity of the machine now used is six posts a minute. The outer rows of holes come together when the sheet is rolled up, and opposite the middle row, so that the keys such as are shown in figs. 2, 3 and 4, can be put through as shown in the section, fig. 3. The top of the post is covered with a pressed steel cap. When pins having a head are used the wire, which may be plain or barbed, is inserted by bending the end of the pin to one side slightly so as to open the slit sufficiently to admit the wire, when a slight bend backward closes up the slit preventing the wire from being lifted out. When this shape of pin is used the post is of course set so that the pin is perpendicular to the line of the fence. The method of using the double end pins is clearly shown in the general view, as is also the attachment for boards which is shown separately in fig. 3.

For ordinary fences this post is made of No. 16 sheet steel, is 7 ft. long, 2½ in. diameter at top and 3½ in. at bottom, and weighs about 9½ lbs. The pins are of ½ in. steel and are 1 in. wide.

It will be noticed that the edges of the sheet do not join at the bottom of the post, so that the post has a spreading foot. It is intended to be driven into the ground, and it is obvious that the interior will become filled with hard earth and that the post will naturally be firmly fixed in the ground. It is said that a fence built with these posts, 24 ft. apart, is stronger than a fence with wooden posts 12 ft. apart. The posts are covered with an anti-rust composition which has given great satisfaction in practice. In setting up wire for this fence the Australian wire stretcher is used. The end post is made heavier than the others, and the holes through it are placed in line with the fence. Cast iron pieces, each having a semi-cylindrical groove are placed on the post opposite each hole for the wire and the stretchers fit into these grooves. The end of each wire is passed through the post and is wound around the central portion of the stretcher by means of a short iron rod or spanner and is kept taut by means of a short pin placed in one of the holes in the other end of the stretcher.

Middlesborough, Ky.

There appears to be good reason for believing that the city of Middlesborough, in Kentucky, which was started with such a flourish of trumpets two years ago by an English syndicate which expendend money so lavishly that the funds were exhausted before anything had been completed will soon recover from the condition of innocuous desuetude into which it had fallen and will fulfil the purpose for which it was designed by its projectors. The location of the city is a remarkable one for business purposes, from its contiguity to both iron and coal and the facilities which exist for distribution of manufactured material to all points of the compass.

Just at present it presents rather a deserted appearance. A magnificent avenue, with macadamized roadway and beautiful wide concrete sidewalks, runs through the heart of the site of the town, and is lined in portions with really fine brick stores, offices and business buildings. The great hotel which stands in a commanding position is one of the finest structures to be found anywhere, and a considerable number of handsome houses and cottages stand on the knolls which flank the town. The population of nearly 10,000 which existed there two years ago must have been nearly all employed in building those houses and constructing the public works, and when all the funds of the Association had been exhausted in this work of construction there was nothing for the inhabitants to do but to emigrate to some other place where there services were needed.

The foundation was laid, however, and the great manufacturing establishments which were expected to begin operation and make the town populous and successful were not idle. The principal difficulty seems to have been that they could not get ready as soon as the town was. Their preliminary work, however, is now nearly completed and the Watts Steel Works are ready to begin the manufacture of basic steel with a very extensive, costly and well appointed plant. The South Boston Iron Works also are rapidly bringing their works to completion and are indeed beginning to remove their machinery to the site they have purchased in the city. The Vaughan Tannery Co., which has a monopoly of all the tan bark within miles of Middlesborough and has now stacked up in its yards thousands of cords of tan bark, is in operation and is said to be handling 250 hides a day; not a large amount to be sure for the extent of their grounds and plant, but still a beginning.

A very complete system of water supply was laid out for the city, and its construction was begun after the plans and under the supervision of Mr. A. H. Martine, C. E., well known from his previous connection with the Fall River, Mass., and Knoxville, Tenn., waterworks. A good deal of money has been expended in the

construction of these works, which are as yet incomplete, largely owing to the insufficiency of the amount subscribed by the English stockholders to carry out the designs as proposed. The extraordinary drought of the last few months and the bad condition of the limited supply impounded in the unfinished storage reservoir excited the apprehension of the owners of the property, and they secured the services of Mr. J. J. R. Croes, M. Am. Soc. C. E., who has made an examination of the works with a view of ascertaining whether the supply is really ample for the projected city, the water of wholesome quality and fit for manufacturing purposes, and whether the several hundred thousand dollars which had been necessary to bring the works to their present condition had been expended in a judicious manner, and, further to advise what was essential to be done to make the works efficient for the early commencement of the operations of the large manufactories and the supply of the population they would necessarily bring with them. Mr. Croes' report has not yet been made public.

One of the most novel features in the improvement in the site of this city, and it may be added one of the most expensive ones also, was the treatment of the channel of Yellow Brook, a stream of some 20 square miles drainage area which flowed in a tortuous course through the site of the city. On the recommendation of Col. George E. Waring and under his supervision, the channel of this stream was regulated by taking out the smaller bends and constructing a channel in long straight stretches connected by regularly laid out curves, with a flat bottom, some 20 ft. in width, floored with planks spiked to sleepers; the banks, which are sloped about 2 to 1, revetted with a similar planking to a height of about 4 ft., above which the slopes were of brush and earth forming a dike above the level of the surrounding meadows. This channel has stood very well for a couple of years, but there are indications of lack of care in the maintenance of the banks and some apprehension is felt lest a freshet should get behind and under the plank protection and do serious damage, unless steps are taken to fill up the little gullies which are wearing in the earth banks above the planking.

The Bouton-Horton Car-Wheel Chuck.

The E. Horton & Son Co., of Windsor Locks, Conn., has recently put on the market a new chuck for holding car wheels. It is constructed with an opening in the centre large enough for the hub and back of the wheel to enter sufficiently for the back of the flange to rest against the body of the jaw, while the bite of the jaw when thrown into work bears upon the chilled face of the wheel flange. The wheel is thus automatically centered for grinding its periphery. This chuck can be used on a Bouton car-wheel grinder or any rotating head that will receive it.

Fig. 1.

Of the accompanying drawings fig. 1 is a perspective view of the chuck, and fig. 2 a sectional view showing the car wheel in position in the chuck, and this and fig. 1 shows the jaw and driving screw, showing the bite shaped to fit the flange of the wheel. Fig. 2 shows the driving screw and pinion gear by means of which the chuck is operated and the slot running the whole length of the jaw by means of which the jaws are interlocked with the body or shell. We are indebted to the *Iron Age* for the engravings and description.

Telegraph Operators' Wages in England.

United States Consul Sherman, of Liverpool, has made a report regarding the wages paid to railroad and commercial telegraph operators in Great Britain, in which he gives the following statistics.

In the government service (all commercial lines are operated by the Post Office department), operators are divided into two classes, and the maximum pay is fixed according to the size or importance of the town. The weekly wages of the second class are as follows:

	First year.	Second year.	Third year.
Men	$2.92	$3.40	$4.38
Women	2.43	2.92	3 65

The second class of men contains twice the number in the first class, and the women's classes are in similar proportions. The number of women employed is one-third of the total force. Eight hours constitute a day's work, and any time beyond eight hours is regarded as extra duty, and is paid for at one rate and a quarter of ordinary wages. Night duty consists of seven hours, with the same pay as for 8 hours of day work; that is to say, every hour served between 10 p. m. and 5 a. m. is regarded as equal to one hour, seven and a half minutes. On Saturdays the operators are allowed one or two hours off if business permits. Operators are paid at the rate of one forty-eighth of their weekly wages for each hour they work on bank holidays and one forty-eighth with one-quarter added for each hour worked on Sunday, Good Friday and Christmas, in addition to their weekly wages. The railroad companies maintain and operate telegraph wires for their own purposes, and also maintain public telegraph wires, which are carried on the same poles as their own wires, for the post office. The railroad companies are allowed commission of 1½d (three cents) for every telegram they forward or receive on behalf of the post office. The charge for inland telegrams is half a penny a word, with a minimum charge of 6d (12 cents.)

On the London & Northwestern railroad the pay of operators is based on 365 days in the year. The question of Sunday overtime was gone into some years ago, and it was arranged to give the operators an allowance of $12.65 a year or $1.05 a month in lieu of overtime, and this is paid them whether they perform one or more day's Sunday duty in the month. The scale of pay for telegraph operators is $146 a year, rising to $389 by annual increments of $24 and the ordinary hours are 10 or 12 a day. The pay of operators in charge is according to the class of station, rising from $438 to $730.

On the Midland operators get: First year, $97; second, $121; third $170; fourth, $218; fifth, $267; sixth, $291; seventh, $316; eighth, $340; ninth, $344; tenth, $389. Eight hours, as a rule, constitute a day's work. The operators employed in the freight department do not work on Sundays or national holidays; those in the passenger department work on such days in rotation, according to the number employed, i. e., if there be only two in an office they work on Sundays and national holidays alternately, and so on, but do not receive extra remuneration for so doing.

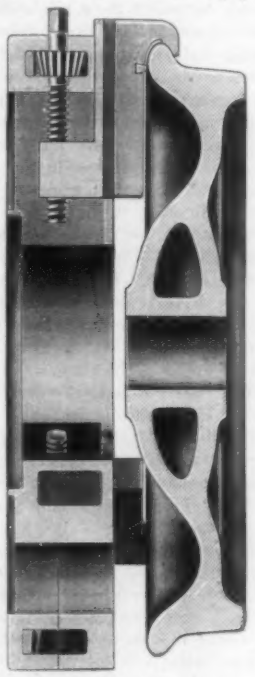


Fig. 2.

Section Showing Wheel Held in Chuck.

Bouton-Horton Car Wheel Chuck

On the Great Western the rates of pay of operators vary in the case of juniors from $97 to $291, and in the case of adults from $340 to $730 a year. The average hours per day are 10. They work on Sundays and national holidays when necessary, and do not receive extra pay for so doing.

On the Lancashire & Yorkshire the wages of first class telegraph operators range from $4 86 to $6.32 a week, and 10 hours constitute a day's work, exclusive of meal hours; but eight hours constitute a day's work of those operators who are required to perform Sunday and night duty in their turn. National holidays are not recognized; neither are the operators compensated specially for working on those days. They are, however, allowed an annual holiday of six days with pay.

Underground Wiring for Electric Railroads.

The following is an abstract of the discussion on the report on a "Model Electric Railway Roadbed and Underground Wiring," presented at the recent meeting of the American Street Railway Association at Cleveland.

Mr. Pearson, of Boston, said, that while the ordinary method of returning the current through the rails and supplementry wire would be sufficient in small towns or where there are few cars running, on large roads where the traffic is heavy, more return grounds than have been used heretofore will have to be installed. It was found in Boston that from a lack of return feeders there was a great deal of electrolytic action on the supplementary wires, and as a remedy a large ammount of over-head copper is being put up for returns. It was not thought advisable to put it underground on account of the rapid corrosion, and there is no advantage in using iron on account of the low conductivity. In regard to using the trolley wire as a positive or a negative, we originally ran the positive current through the trolley wire, but we found that the action on the supplementary wire was too great, and we changed it and put the negative to the trolley wire. This merely transferred the action to another point.

In answer to a question regarding trouble with water pipes, Mr. Pearson said that he did not remember any particular trouble with water pipes, but if there is a large current passing through the earth it will take hold of any convenient pipe, and there will be electrolytic action. In any large railroad system, if the attempt is made to use the earth for return ground by putting in ground plates in driven wells, or elsewhere, and a good metallic circuit is not provided for the return current, the current must inevitably injure the water pipes and all other pipes. The current when it leaves the cars goes into the ground, and taking a water pipe may go a mile on that pipe, and then leave it for a better conductor; the result being that the pipe will be corroded at this latter point.

Mr. Richardson, of Brooklyn, asked in regard to using old rails as returns by putting them in the ground, using 5 or 6 or more, side by side, and so making a continuous path for the return circuit, proper fastenings being provided.

Mr. Pearson thought it would be difficult to make a good joint, and that without it there would be heating and corrosion, and that a copper joint would not do as there would be electrolytic action under any circumstances. It was attempted in the early days of electric railroads to use the rail for the return conductor without putting in supplementary wires, and found almost impossible to maintain a joint of any sort. When a large current is passed through a joint oxidation takes place, and the joint soon becomes worthless. This condition will exist no matter how large the joint is made, and if dissimilar metals are used a local electrolytic action will also take place.

In answer to another question Mr. Pearson said that they had used a considerable quantity of old steel and iron cable, in getting across rivers and connecting supplementary wires, but that it cut away very rapidly. For instance, in one place seven cables were put in with thoroughly soldered joints, and in less than four months they were entirely gone.

Mr. F. S. Holmes said that he had the opinion of an engineer experienced in street railroad work, to the effect that when there was a sufficient number of ground plates along the line the current was about equally divided between the rail return and the ground wire. The construction we have to day, where ground plates are used for return currents, makes the trolley wire and the various plates and supplementary wire along the line of the road positive and the large ground plate at the station negative. This is wrong, because the supplementary wire and ground plates along the line are rapidly corroded, while the negative plate at the station is uninjured. The conditions should be reversed, the station plate being made positive and the line plates and supplementary wire and trolley negative to it. Corrosion will then be largely confined to the station plate, which can be easily replaced. To accomplish this the current must, of course, flow out by the ground, which will be positive, and back by the trolley wire, which will be negative.

Moving the Harlem Lift Bridge Tower.

The tower of the lift drawbridge recently erected for the New York Central & Hudson River Railroad, at 135th street and Fourth avenue, New York City, the purpose and details of which were fully described and illustrated in our issue of June 10, 1892, is to be moved to a point some distance above its present location. Here it will be used to lift a similar draw on the temporary line, now in course of construction, for use during the erection of a new four-track drawbridge with a clear height of 24 ft. above the level of the Harlem River.

The method to be employed in moving the tower is extremely simple. Two trestles have been built from under the front and back ends at right angles to the line of the railroad for a distance of over 200 ft. In that under the forward end, upon which the greatest weight will rest, the 12 piles are driven five abreast, and in the back trestle three abreast. The piles are capped by 12 in. × 12 in. timbers on which are laid 12 in. × 12 in. stringers and upon these rails, upon which, thoroughly greased, the tower is to be pulled. The tower will be jacked up about 18 in. and the stringers and rails slipped under.

The chief difficulty lies in getting the tower clear of the two tracks which now pass through it. This will be done in the early hours of some Sunday morning when there is no travel on the road. A large force will quickly remove sufficient of the track, to allow the structure to be pulled past, when it can be replaced at once. The engine by which the tower will be pulled is stationed just beyond the end of the trestles. The tower will then have to be moved still further a distance of about 170 ft. Here it will be turned outward through a small angle and upon other trestles moved out in the same way into the stream about 200 ft. to its position at a channel now being dredged. When everything is ready the moving can be done in one day. It will be cheaper to move the tower in this way than to erect a new one. The work is being done by the builders of the bridge Cofrode & Saylor.

Pantasote Leather.

This is an imitation of leather which has been but very recently brought out, and which is now being put before railroad men as applicable to a variety of uses, particularly for covering seats and for window shades. It has a very agreeable surface and feel, and being entirely free from India rubber it will not harden, crack or get sticky as so many leather imitations do. It is waterproof, very soft and pliable and without odor. We have no evidence of its durability, which the makers claim, however, to be great, and which claim they can doubtless substantiate; but if it is durable it will probably have a considerable use for car furnishing as well as for a great many other purposes more or less related to railroading. This material is controlled by Clarence Whitman & Co., 39 Leonard street, New York City.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We print in another column a letter on import rates and Judge Wallace's decision in the Texas & Pacific case. This letter was received before we wrote last week on a cognate topic, and some of its points were answered in the article printed then. Others are answered substantially by the writer himself. The efforts of the Interstate Commerce Commission to set up a wall at the frontier—*i. e.*, the Atlantic seaboard—and to compel the railroads to so adjust their rates that the rates inside the wall can be supervised and regulated by the government while leaving those outside undisturbed is, in many respects, commendable. That is the natural way to do, and in adminstering any sort of law a territorial limit of some kind is one of the first things that has to be settled by those who have to deal with the details. And the decisions of the courts, laying down the rule (not a new one) that you cannot punish a wrongdoer who is out of your reach confirms this view. The decision of Judge Allen in the Knight case may not please the Interstate Commerce Commissioners as regards the case it applies to, but it tends to support their action in regard to rates from Europe. But the worst difficulty about regulating rates from Liverpool to San Francisco or Chicago, or *vice versa*, is that orders cannot be practically enforced so as to do any good, even if they are declared legal. The matter of a few shipments of hardware to San Francisco is comparatively unimportant. We presume that the Texas & Pacific has complied with the commissioners' order in that case. But it is absurd to maintain a net to catch these little fish when the big fish on the grain exporting lines are all the time going free. The principal complaint about European rates was that concerning export grain over the trunk lines, and that has never been satisfied. A railroad which is ordered not to pro-rate with an ocean vessel except at certain prescribed rates can buy up the steamship line and then go on with the business, not caring which end secures the profit. A law forbidding railroads to own stock in steamship companies will be necessary before pro-rating can be stopped, and such a law will probably never prevail in this country. The long existence of the agreement between the transcontinental railroads and the Pacific Mail Steamship Co., recently abrogated, illustrates the difficulty of regulating transportation on the great free highway of the ocean. Most people, in drawing up a charter for a railroad from Chicago to Denver, would hesitate not a moment to insert a provision forbidding dealings with a steamer from New York to Aspinwall, if such a prohibition were deemed necessary; and the payment by the several roads of $75,000 a month, more or less, to the Pacific Mail was as palpable a violation of the *spirit* of the anti-pooling law as could be imagined; but nothing whatever was done to stop the subsidy, probably because no one could devise any hopeful way of attacking it. When the Interstate Commerce Commission investigates an intricate mass of facts and conflicting claims, and orders an adjustment based on the wisest discoverable compromise, it is greatly to be desired, as our correspondent says, that its orders be accorded the weight due to the decision of an impartial tribunal. This is desirable even on the principle that the best way to get rid of a bad law is to enforce it. In certain respects the Interstate Commerce law is a bad law; not because it does not aim to do justice, but because it cannot be enforced. An unenforceable legal prohibition weakens respect for other laws, and its presence on the statute book should always be a matter of concern, unless it be one which deals with acts that are always and essentially evil.

Jay Gould.

By the death of Jay Gould the socialists and anarchists have lost their mightiest ally. His work has done more for their cause than all the arguments of Marx or the diatribes of Most. It was precisely such work as his that gave those arguments and diatribes whatever force they may have possessed. The essential feature, common to socialism and anarchism, is a protest against modern business methods. Whoever develops those methods in the right direction weakens the socialistic party; whoever develops them in the wrong direction strengthens it. Jay Gould developed business methods in the wrong direction; he brought out their possibilities of evil rather than their possibilities of good. He thereby gave point to the charges of the socialists against our commercial system; and the community, so far as it tolerated his methods and acquiesced in this development, in some measure pleads guilty to the charges.

There are two radically distinct conceptions of business. Under the older one it was regarded as a contest between buyer and seller, in which each party sought to gain at the expense of the other. The buyer was anxious to pay less than the article was worth, the seller to charge more than it was worth; the latter by his superior knowledge being on the whole likely to come out ahead. This conception of trade is still held by the socialists. But in the world as a whole it has been replaced by a broader view. We no longer regard business as a fight between buyer and seller, but as a means of mutual service. If the merchant can sell at a good price, it is because his wares meet an actual want. If he can make a profit in so doing, it is because he knows how to organize production to advantage. If prices at any moment seem too high, the community can end the trouble soonest by letting business men find the most efficient means of supplying the want. To a man who looks at matters in this way, the capitalist appears not as an extortioner, but as a public servant. It is not too much to say that the whole structure of modern society is based upon this view of business. We give the capitalist control of industry because we believe that in intelligently serving himself he serves others also. It is because of the essential soundness of this idea that the pursuit of wealth is an honorable ambition, instead of a base matter of avarice. The man who makes money legitimately has presumably made it by serving his fellow men; and the power which its possession confers is, in its best and truest aspect, the power of rendering additional service to society on a yet larger scale than before.

Of the truth of this view we need seek no better examples than Vanderbilt or Scott, or Edgar Thomson, or a number of no less honorable names among those who have succeeded them. Vanderbilt served himself in serving his stockholders and the public. He made money by doing an enormous business at low rates, with methods of far sighted economy. He made his money, not by raising charges but by lowering them. His fortune, however large, was small in comparison with the pecuniary benefits which he conferred upon producers and consumers. He made, perhaps, a hundred millions; but he gave new life to the trade of the United States, and cheap food to the world.

But side by side with Vanderbilt were other men who exemplified the older and worse conception of business; who regarded it as a fight, or, at best, as a game, in which the gains of one man were to be sought in the losses of another. Such men sought success quite as often by mismanaging the property intrusted to their charge as by managing it well. Breach of faith, so long as the law could not punish it; appropriation of trust funds, so long as it did not land the perpetrators in states prison; legislative and judicial corruption, so long as the influence to be purchased was worth the price charged—all were regarded by these men as legitimate, if only they were crowned with success in money getting. What should have been a means of serving society was made an end, and every other end was subordinate to it. The story of the operations of men like this, in our worst period of commercial abuse, has been told with unrivaled force by Charles Francis Adams in his "Chapters of Erie."

It is fair to say that even in the worst days society was not quite satisfied with transactions of this sort. The men who engaged in them felt this. Some, like Daniel Drew, tried to propitiate public opinion by attendance on prayer meetings and gifts to religious objects. Others, like Fisk, went to the opposite extreme, and set public opinion at defiance, by a career of reckless libertinism. Gould made neither of these mistakes. He neither sought to defy society nor to propitiate it. It may be that he was so interested in the game of money-making that he was actually indifferent to everything else. It may be that he believed that, if he was successful in money-making, society would ultimately condone the means used. If so, he was partly wrong and partly right. Public opinion was never quite ready to pardon some of his worst offenses. Laws were made to prevent their repetition, and the enforcement of these laws was watched with a care that would have made the repetition of some of the chapters of Erie impossible. But in Gould's central conception of corporate finance as a game instead of a trust, society has on the whole acquiesced. Society has improved the rules of the game from year to year, and has held the umpires up to a strict performance of their duty; but it looks with leniency on violations of fair play which do not infringe the rules in such a way as to attract the umpire's notice. This conception has degraded not only our finance, but our politics and our law. Lawyers who would repel the very suspicion of personal corruption do not hesitate to take large fees for advising the representatives of corporations as to the manner in which they may evade their moral duty as trustees of the business interests of the country without coming into direct conflict with the law. So far as a man accepts this conception of business he becomes a partner in the public wrongs of men like Gould, even though he refuses to profit by their private ones. He becomes a sharer in their responsibility, if not in their guilt. His responsiblity may be less than theirs, but in the face of the freshly-closed grave it is more seemly for society to pass judgment upon the survivors than to preach against the dead.

Three hundred years ago, there lived at Florence a man named Benvenuto Cellini, who was regarded by the Italians of his day as having made a signal success of his career. An accomplished politician, a brilliant artist, a fast and furious liver, he attained what his contemporaries most coveted, and literally "drank life to the lees." A propensity to commit murders sometimes threatened to interfere with his career, and even to bring him to the scaffold, but he had influence with the authorities, and it took so long to catch him that he was usually able to plead the statute of limitations. He wrote a curious and apparently truthful autobiography, in which he recounts his crimes with great candor. There is no evidence that he or his contemporaries regarded murder as anything but an ordinary incident in the career of an active business man—not a pleasant incident, perhaps, and a dangerous one at best, but withal something that was to be judged with great leniency, especially if you escaped being hanged or beheaded for it. It is obvious that if we should judge Cellini by the standards which we should apply to a murderer of the present day, we should make a great mistake. When society acquiesced in murder and tolerated it it transferred from the individual murderer to itself no small part of the responsibility.

In the three centuries that have since elapsed public opinion on the subject of murder has become stricter. No man could run a course like that of Cellini without making himself an outlaw. The weak point of the decalogue is now to be sought in the eighth commandment rather than the sixth. People have learned not to tolerate deeds of violence nor to expect such toleration for themselves. They have not learned the necessity of an equally intolerant attitude toward fraud. The nineteenth century extends to deeds like those of Gould the same easy judgment which the sixteenth century extended to Cellini. Yet it is from precisely these deeds that our century has most to fear. An unscrupulous financier may readily do more harm than any burglar, or perhaps than any murderer, though neither he nor his associates see it.

Take the case of the Kansas Pacific transactions, for which Jay Gould has been recently commended by resolution of the directors of the Western Union. What were the leading facts in this case, omitting certain darker side transactions connected with it? Gould bought the stock of a number of small lines at a low figure, made use of his position in the Union Pa-

cific to sell them at an unduly high figure, and thus loaded the Union Pacific with burdens and himself with dollars. Now, if we can get ourselves sufficiently away from our nineteenth century standpoint, let us see what this means. He not only took money from the investors to enrich himself, but he made use of a position of trust to despoil those who had trusted him; and, worse than all this, he was false to the duties of the still wider position of trust which society had given him as a leader in the business of the country. The excuse that he and his associates did not look at things in this way may relieve him of some of the personal blame, but renders the transaction itself all the more dangerous. It is not from avowed law-breakers like Fisk, whose careers throw odium upon their commercial transactions, that society has most to fear, but from men who maintain a respectability of private character which wins toleration for their breaches of public trust.

With the extension of business in recent years, and the development of new industrial and commercial methods, our rich men have attained a power of directing the world's affairs such as they never had before. The only thing in history which can be compared with it is the power which Napoleon attained in directing the political and military forces of the civilized world. He acquired that power by using his talents in the service of France. He yielded to the temptation of making power an end and not a means. In the pursuit of war and politics as a game he ceased to regard his power as a trust. We know what happened to him and to France. Jay Gould has been called the Napoleon of Finance. Let us beware that the parallel does not hold true to the bitter end. Our financiers, as a class, past and present, have won their power as a public trust, in the public service. They have been allowed to direct the industries of the country, because such direction enriched others as well as themselves. A career like that of Jay Gould's, where one man has enriched himself phenomenally at the expense of others, and not in the service of others, is at once a breach of public trust and a menace to existing institutions.

The Eleventh Census and the Railroads of the World.

A census bulletin giving the railroad mileage of the world has just appeared and the general table showing the absolute mileage and the mileage relatively to area and population was published in our last issue. We shall publish other matters of interest from the bulletin next week. Further examination of the general table shows that it ought not to go out to the world without some comment on its peculiarities. Appearing as it does as the work of the statistician of the Interstate Commerce Commission and as a part of the work of the eleventh census of the United States it will be taken as final authority, but there is reason to suspect that it is a careless and incomplete job.

The column of mileage in the general table of the world's railroads is the one from which the deductions in other columns flow. The sources of information from which this column was compiled are not even hinted at in the text of the bulletin; nor are we told whether the figures are for the beginning, middle or end of 1890. Those for the United States are the Interstate Commerce Commission's quantities to June 30, 1890. It is apparent, however, that very much of this information was taken from the table printed in the *Archiv für Eisenbahnwesen*, in the May-June, 1892, issue of that excellent publication. Of this we cannot be sure, and perhaps there are some corrections made from later information; but the internal evidence is strong that most of the mileage is from that journal. There is practically no change of arrangement and there is little new information. The names of the countries are translated into English and the kilometres converted into miles. The *Archiv* is a very respectable authority; the weight of the census table would not have been diminished by giving the source of the figures used, and the facts were sure to come out, for "you can't fool all the people all the time."

But in using the *Archiv's* table some one made some bad omissions. Jamaica and the Windward Islands, which appear in the *Archiv* with 474 kilometres of railroad do not appear at all in the census bulletin. Asia Minor with 800 kilometres, Portuguese India and the Malay States with 154 kilometres, Egypt with 1,547 kilometres, the Orange Free State 237 kilometres, and the Mauritius, Réunion, etc., 910 kilometres, are all omitted. The sum of these omissions is 4,122 kilometres, and it cannot be said that the countries left out are all unimportant and obscure. Egypt, for instance, has had a good share of the world's attention for some centuries and has a population of about 6,500,000.

But the omissions are not the worst part of the mileage column of the census table. It is quite obvious that a wrong factor has been used in converting kilometres into miles. In 13 cases we have divided the miles in the census table by the kilometres in the *Archiv* table and find a quotient varying from .584 to .620; the average of the 13 cases being exactly .607. Of course the result in miles is too small in every such instance, and the aggregate error is considerable. The correct factor is .621375; and, while it may be said that the occasion did not justify using six places of decimals, it will be said also that census statistics that are not accurate are worse than no statistics. Certainly the labor of computation, even using five or six decimals in the factor would have been trifling. With a seven place table of logarithms a bright lad could have made the conversions in two hours, and made them accurate to the units place at least.

The column of populations in the census bulletin agrees in very few instances with that in the *Archiv*, nor does it agree with the figures given by some other careful authorities; but with this part of the table we shall not quarrel until we can ascertain the sources from which it is drawn. Very likely those sources are more correct than any at our command.

A New Type of Locomotive.

Three double bogie Johnstone compounds have just been constructed for the Mexican Central by the Rhode Island Locomotive Works and the first of these engines was tried under steam at Providence, R. I., on Dec. 6. The trial was interesting as these engines are not only of very novel and ingenious design but are undoubtedly the most powerful ever built. They are designed to haul freight trains between Tampico and Mexico over long three per cent. grades (158.4 ft. per mile) with 18 deg. curves on the main line and 22 deg. curves on sidings. This great amount of curvature places large engines of the consolidation or decapod type at a disadvantage, and the practice has hitherto been to work trains with Mason bogie engines. These engines have but six coupled wheels and weigh 195,000 lbs., the weight of the two engines used being in all 390,000 lbs. The Johnstone double bogie engine while having in all the same number of coupled wheels is considerably lighter, weighing about 250,000 lbs. in working order, and this saving in dead weight will, it is expected, enable a greater load to be hauled.

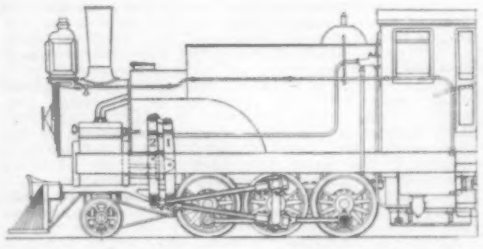
The regular load of one of the new double bogie engines on the three per cent. grades is expected to be 13 eight-wheel cars fully loaded with 40,000 lbs. each. This load would be about 50 per cent. in excess of the regular load which a large consolidation could haul over such a grade with less severe curvature. As the adhesion weight of the engines is about 210,000 lbs. and their rigid wheel-base is very short this estimate of their hauling capactity appears to be well within the mark. The total tractive force required would be about 35,000 lbs., or only one-sixth of the adhesion weight.

The boiler is of the Fairlie type, two fireboxes, back to back, and two boiler barrels being used.* The engineer stands on one side of the engine and the fireman on the other, the firebox casing, containing the two fireboxes, being between the men. This arrangement, of double fireboxes entails an obvious disadvantage, in separating the men, but appears to be the only method of getting over the difficulty of the fluctuations of water level on steep grades. With an ordinary form of boiler the water level falls considerably at the back end of the firebox when descending such a steep grade as three per cent., and in ascending, while there may appear plenty of water in the glass at the rear end, the front end of the crown sheet and the flues may be nearly dry. With the inexperienced firemen found in such a country as Mexico, this may be a serious disadvantage.

The necessity for obtaining a very powerful engine with a very flexible wheel base, led in the original Fairlie engine to the drivers being grouped in two separate trucks or bogies, each complete in itself, with cylinders, valve gear and steam pipes. While the cylinders were fixed to the truck frames, the steam pipes were made flexible by means of sliding and spherical joints, so as to accommodate the swiveling of the trucks. Some difficulty has always been found in keeping these steam pipe joints tight, and the valve motion was also very inaccessible, being blocked by the framing of the swivelling trucks and the steam pipe connections.

Mr. Johnstone, the Superintendent of Motive Power of the Mexican Central and the designer of these engines, has got rid of these difficulties by securing the cylinders to the main frame of the engines and introducing flexible connections between the crosshead and the crank pin. It is of course obvious that moveable joints in rods are far easier kept up than sliding and rotating joints in steam pipes, and as the whole of the rods and valves are outside they are more accessible than in the Fairlie engine.

The motion is communicated from the crosshead to the crank pin in an exceedingly ingenious manner, especially arranged to avoid the necessity of having excessive clearance at the ends of the cylinder to accommodate the swiveling motion of the trucks. Another object to be accomplished was to avoid making the pull and thrust of the connecting rods swivel the bogie on its centre at every stroke. These objects appear to be well attained by the means adopted. The cross head communicates motion to a vertical lever, 1, pivoted in the centre to the cross head and connected at the lower end to an ordinary connecting rod, and thence to the main crank pin. The upper end of this vertical lever is coupled to another vertical lever, 2, which is fulcrumed near its centre to the main frame, and its lower end to another connecting rod which takes on to a return crank. The result is that, when working on a tangent, the first vertical lever always remains vertical and half the pressure on the piston is transmitted to the lower end and its connecting rod, and half to the upper end and thence through the second vertical lever to the return crank. As, however, there is a thrust on one connecting rod and a pull on the other there is no resultant force to twist the truck or bogie round the centre pin and the engine runs steadily forward.



When the engine strikes a curve, the first vertical lever moves slightly on its centre fulcrum on the crosshead and remains so until the engine leaves the curve. This reduces the necessary clearance in the cylinder by more than one-half.

In order to make the pull of one connecting rod exactly balance the push of the other in their effect on turning the bogie on its centre, the second vertical lever is not made with equal arms. The lower arm, measured from the fulcrum, is slightly longer than the upper arm, so that the pressure of the outer connecting rod on its return crank is less than that on the inner crank, in the same proportion as the outer crank pin is at a greater distance from the centre of the truck than the inner crank pin. The latter, having the least leverage measured in a horizontal plane, has the greatest pressure.

The crank pins and small bearings are made universal joints so as to accommodate themselves to the swiveling of the truck. This is accomplished in a very neat and efficient manner, and as the bearing surfaces throughout are ample, there should be little trouble from wear.

The cylinders are annular, the high pressure inside the low, and each combined cylinder is equal to an ordinary single expansion cylinder of 19 inches diameter. As the first vertical lever acts as an equalizer and distributes the pressure between the inner and outer connecting rods, the pressure on each connecting rod can only equal that due to an ordinary 13-inch cylinder.

It is of course a question whether so great a complication of rods will prove satisfactory in practice, but it is only fair to point out that the comparison should be made not with one engine, but with two. Is it not better to have one powerful, though somewhat complicated, engine, worked by one crew, than two engines, worked by two crews, and having a considerably greater total weight? As the curves practically limit the wheel-base to six coupled wheels, any comparison with consolidation or decapod locomotives, is, it is claimed, out of the question, and it would certainly appear under the special conditions obtaining on the Mexical Central—long three per cent. grades and 18 and 22-deg. curves—that there is a good deal to be said in favor of the plan adopted by Mr. Johnstone.

While engines of simple construction will doubtless always be preferred for ordinary service, these engines must be regarded as the pioneers of a new type, which promises to be very serviceable under exceptionally trying conditions of mountain work.

*The engine in question was illustrated in our issue of March 25, 1892.

Judge Riner's Decision on the Anti-Trust Law.

The recent decision of Judge Riner in the United States District Court at Topeka was reported and discussed in the *Railroad Gazette* of Dec. 2 The full text of the decision shows that the whole question was very carefully gone into. The District Attorney, claiming that the Trans-Missouri Freight Association was an unlawful combination in restraint of interstate commerce, based his argument on the allegation that the Association had control of competitive traffic with power to punish by fine any member refusing to use rates fixed by the Association. It was alleged that the roads, ever since the agreement took effect, had "refused to put in force reasonable rates." The roads deny that they have fixed arbitrary rates; or that rates have been increased or the effect of free competition counteracted, and they deny any purpose to monopolize freight traffic. They admit the provision for fines, but say that no attempt had been made to enforce the collection of fines since 1890. The agreement was filed with the Interstate Commerce Commission. It contained a provision, familiar to railroad men in other agreements, that a road applying for a change in rates, and the application being refused by the Association, might make such rates notwithstanding the refusal, and it is alleged that such reductions had been made in many instances.

The decision was based, as was indicated last week, on the fact that no actual tendency to increase rates beyond reasonable figures was shown. The Judge says:

> Where the contract is publicly oppressive and the restrictions are broader than necessary for the legitimate protection of the party to be benefited by the contract, then the contract is unreasonable and a contract in restraint of trade and therefore void, otherwise not. Undoubtedly all contracts which have a direct tendency to prevent healthy competition are detrimental to the public and therefore to be condemned, but when contracts go to the extent only of preventing unhealthy competition and yet at the same time furnish the public with adequate facilities at fixed and reasonable prices and are made only for the purpose of averting personal ruin, the contract is lawful. . . . Such agreements, instead of being obnoxious to the law, because detrimental to the public interest, are to be upheld, for the reason that they benefit the public by preventing unjust discrimination among shippers. . . . The term competition must not be construed to apply solely to the question of rates. There are many other considerations included within the term. There may be, and as we all know, there is, very active competition between the railroad lines operating within the region described in the bill, each one endeavoring to secure patronage by offering to the public advantages in the matter of equipment, etc. . . . While it is true that the public are entitled to adequate facilities and to just and reasonable rates, they are entitled to just that and no more; and the allegation of the answer is, that this was the very purpose of the contract. This allegation is to be taken as true in this case. . . . .

This view is set forth repeatedly. In other words, the contract which formed the basis of the Association alleged that the railroads aimed only at justice and equity, and in the absence of all proof to the contrary, this statement is to be accepted as full and fair.

As to the point raised by the Government that the agreement amounted to a transfer of franchise and corporate powers, and for that reason was forbidden by public policy, Judge Riner holds that each company is left perfectly free to transact all the business it can secure and in its own way, and therefore finds that there is nothing in the Government's claim that the contract, whether carried out by a regular officer, or a mere agent, specially authorized on behalf of each corporation, involved or necessitated the surrender or transfer of any corporate prerogatives or duties. In view of the voluntary nature of the main provisions of the agreement and of the easy method provided for taking independent action whenever any road felt dissatisfied with the decisions of the Association, it would doubtless be a difficult matter to controvert this part of the decision.

Judge Riner has formed a very clear conception of the case, and the railroad officers, who, in published interviews, commend him as broad minded, have good ground for their opinion. But the people of Kansas will not relish the decision, of course. They want, not reasonable rates, but *low* rates, to compensate them for submitting to what they regard as unreasonably high rates in the past. In permitting the building of numerous railroads they were aiming, not at the establishment of the healthy competition which Judge Riner says the law will allow them, but rather to get the sharpest possible competition, healthy or unhealthy. That is what we must conclude from numerous public utterances, newspapers and other. The discussion of this question of keeping competition just at the right degree of intensity forms the pith of the decision and the judge sets forth the principle very clearly. One point, however, he might well have enlarged upon more than he did, and that is the importance of stable rates. A chief reason why it is right for railroads to make agreements to maintain tariffs, even if some of the rates do not conform to the lowest standard that can be maintained without going into bankruptcy, is that regularity is often more important than cheapness. It is better for the grain shipper to *know* that the corn rate to Chicago will be 20 cents for three months to come than to be living in the hope that it will go down to 18, coupled with the fear that it may go up to 23. As to whether the anti-trust law of July 2, 1890, applies to common carriers the decision says:

> It will be seen from an examination that this [Interstate Commerce] act is in the nature of a special act, being confined in its application to common carriers. The act of July is clearly by its terms a general statute. It includes every contract or combination in the form of a trust or otherwise or conspiracy in the restraint of trade, and every person who shall monopolize or attempt to monopolize any part of the trade and commerce among the states. I think no rule is better settled than that where a general statute has been enacted, which might include, in the absence of other provisions, a subject matter which has already received consideration at the hands of the Legislature by a special act, that the general act will not be construed to embrace the subject contained in the special act, unless it clearly appears from the language employed that it was the intention of the legislature that it should be included. The intention of the legislature . . . is to be ascertained from the words used in the statute and from the subject to which the statute relates with a view of meeting the mischief sought to be remedied, and in doing this it is the duty of the court to restrict the meaning of general words whenever it is satisfied that the literal meaning would extend the statute to cases which the legislature does not intend to include. . . . Applying these rules can it be said that it was the intention of Congress to include common carriers, subject to the Act of Feb. 4, 1887 (Interstate Commerce), within the provisions of the Act of July 2?

Judge Riner concludes that such was not the intention of Congress and therefore the Anti-Trust Act is not applicable to common carriers. It is apparent from his opinion that he bases his conclusions upon the fact that the Interstate Commerce Law covers all the ground as to common carriers that the July act covers as to every other person and corporation. Here, we think, he is in error. The Interstate Commerce Act was not primarily an Anti-Trust Act nor an act designed to invalidate contracts or combinations in restraint of trade, and its operation in these directions is incidental. The scope of the act was, briefly, to regulate railroad charges and to prevent unjust discriminations. These objects of course had to be worked out in all the minuteness and particularity of legal phraseology. Pooling was, indeed, prohibited, but that is only one method of combining. Whereas the purpose of the July Act was entirely different. We can readily see how common carriers can enter into contracts that would not be obnoxious to the Interstate Commerce Act, but would be entirely so to the July Act, and if so we see no reason why the July Act should not apply according to its terms whether the offending party was a common carrier or a hod carrier. Of course these views do not involve an approval of all or any of the legislation on this subject. We are not discussing whether such acts ought to be passed, but simply what they mean as they have been passed.

Electric Traction on Standard Railroads.

Mr. Griffin, whose letter appears elsewhere, is a seeker after the truth, with a human hankering after his own kind of truth. We cannot hope to settle forever all the questions that trouble him, but we will suggest a few considerations that may help him along a little.

For instance, he suggests $5 per horse power per annum for 24-hour power, delivered at Niagara Falls, as a point of comparison with the cost of steam locomotive power. But let him take the New York Central road and calculate the cost of conductors to supply the line with electricity, the cost for repairs to them and the losses on the line and in the motors. Mr. Griffin would find his $5 per useful horse power on the axles of the motor to be so much increased that the steam locomotive would be cheaper than electricity. On the other hand, in the case of a short road near the Cataract Co.'s plant, there is no doubt that the power could be supplied to trains cheaper by electrity than by steam. The question is largely one of location. Mr. Westinghouse was not solving the problem of a road in the vicinity of Niagara Falls, but rather the problem of roads in general throughout the United States. But we do not agree with Mr. Westinghouse in all his estimates. His cost of apparatus seems enormously large. Let Mr. Griffin ask the Cataract Co. the price of an electric horse power delivered in the vicinity of Albany, and he will find the $5 increased to over $100, per horse power delivered at the motors. Then let this amount be increased to allow for the losses between the horse power of the electric current at the motors and the horse power on the axles of the motor, and he will find still another increase almost as great as the one preceding.

Regarding the cost of producing a horse power on a locomotive, a few figures were given in the *Railroad Gazette* June 17, 1892, for suburban use. The cost for other service, or express lines, is very indefinite and depends largely upon the cost for coal and the conditions under which it is produced. The horse power of a locomotive is quite a variable quantity.

Now let us turn to some of Mr. Griffin's other questions: 1,400 horse power is not very high for a six wheel express locomotive when running at high speed. It corresponds about to what the heaviest express engines require at times. It not only requires the production of as much power to haul trains with electric motors as with steam locomotives, but it requires more for the reason that there is a decided loss between the central station and the useful work done on the motor, which is not true of the steam locomotive. Of course, this loss is somewhat offset by the greater efficiency of the stationary engine, but not to the extent that is generally supposed, as the steam locomotive is a comparatively economical machine.

It is necessary to calculate on a much larger motor in proportion to the passengers carried for a standard railroad service than for a street railroad service, for various important reasons. The principal ones are, first, for standard railroad service our cars are as light as they can be made with safety to the passengers without the use of some lighter material which is equally strong. For all purposes of the present discussion it is true that our railroad cars are as light per passenger as they can be made or will be made for some time to come. And, second, not only must the steam locomotive have the weight to get traction, but the electric locomotive must have practically the same weight. There is some saving in doing away with the weight of the coal and water and tender, but this is comparatively small in proportion to the total weight of the train.

It is quite fair to base calculations regarding electric locomotives on the difficulties that must be overcome with steam engines, and to be strictly correct, other matters should be included which pertain to other difficulties and more of them, which the electric locomotives will have to overcome when they are used to haul heavy express trains, as Mr. Griffin will know if he is acquainted with electrical work. Several of these matters are the method of collecting the current from the conductors at high speed; the method of controlling the electric locomotive to get economical action at various speeds; the scheme for equalizing the potential along the line, and the transmission of power between the armature and the wheels. None of these problems have yet been solved; and he who would buy electric locomotives for heavy express work at the present time would purchase these features as cats in a bag.

The difference between the actual useful horse power on the axles of a steam locomotive and electric locomotive to accomplish the transportation of a given number of passengers is nil, when the same degree of safety is provided for the passengers in both cases. The question of lighter cars at higher speeds has been well thrashed over for elevated road service, and a little reflection and some references to various articles on the subject in the files of the *Railroad Gazette* will show Mr. Griffin the absolute necessity for using strong cars when running at high speeds; and a perusal of articles on the application of electricity to trunk lines (see issues of June 24, July 6, and Nov. 4, 1892), will possibly clear the vision a little.

October Accidents.

Our record of train accidents in October, given in this number, includes 96 collisions, 94 derailments and 6 other accidents, a total of 196 accidents, in which 62 persons were killed and 162 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest. These accidents are classified as follows:

Collisions:	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two	11	..	..	11
Misplaced switch	1	1	2	4
Failure to give or observe signal	5	3	2	10
Mistake in giving or understanding orders	..	8	2	10
Miscellaneous	6	1	7	14
Unexplained	17	8	19	44
Total	43	21	32	96

Derailments:			
Broken rail	5	Careless running	2
Defective bridge	6	Bad switching	3
Defective switch	5	Bad loading	2
Broken wheel	..	Animals on track	6
Broken axle	4	Landslide	1
Broken car	2	Maliciously misplaced switch	2
Broken truck	1	Accidental obstruction	1
Broken drawbar	1	Unexplained	42
Too quick application of brake	1		94
Misplaced switch	10		

Other Accidents:	
Boiler explosion	1
Cylinder explosion	1
Broken side rod	1
Other causes	3
	6
Total number of accidents	196

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c.
Defects of road	..	16	..	16	8
Defects of equipment	14	9	3	26	13
Negligence in operating	38	17	1	56	29
Unforeseen obstructions	..	10	2	12	6
Unexplained	44	42	..	86	44
Total	96	94	6	196	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	29	29	4	62
Freight and other	144	60	2	215
Total	173	93	6	277

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
KILLED:				
Employés	24	21	2	47
Passengers	10	1	..	11
Others	..	4	..	4
Total	34	26	2	62
INJURED:				
Employés	48	32	3	83
Passengers	48	29	2	79
Others	..	..	..	..
Total	96	61	5	162

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	1	24	6	3
Defects of equipment	..	..	2	3
Negligence in operating	10	53	25	59
Unforeseen obstructions and maliciousness	..	1	6	6
Unexplained	..	1	8	12
Total	11	79	47	83

Thirty six accidents caused the death of one or more persons each, and 34 caused injury but not death, leaving 126 (64 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with October of the previous five years shows:

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions	96	120	152	112	82	64
Derailments	94	96	115	70	58	49
Other accidents	6	13	16	8	6	4
Total "	196	224	283	190	146	117
Employés killed	47	42	71	43	45	36
Others "	15	16	17	8	75	14
Employés injured	83	100	204	133	120	50
Others "	79	79	176	91	103	59
Passenger trains involved	62	67	97	73	54	38
Average per day:						
Accidents	6.32	7.23	9.33	6.13	4.71	3.77
Killed	2.00	1.87	2.84	1.65	3.87	1.10
Injured	5.23	5.77	12.26	7.23	7.19	3.52
Average per accident:						
Killed	0.316	0.259	0.311	0.268	0.821	0.291
Injured	0.827	0.799	1.343	1.179	1.527	0.931

The worst accident in October was that at West Manayunk, Pa., on the 24th, killing five passengers, which has been already discussed in the *Railroad Gazette*. Of the other six passengers killed, five were in a freight train near New London, Conn., on the 14th. These men were in charge of horses and were in the car next to the engine when the collision (butting) occurred. A coroner's jury censured the road for placing a car containing men and valuable horses next to the engine. This seems reasonable enough, and yet there are more cattlemen and horsemen killed in cabooses at the rear end of trains than in any other class of railroad accidents. The cause of this New London collision seems to have been the recklessness of a night operator at Norwich, who, after being called 45 minutes, finally answered and said that the freight train had not passed, when in fact he did not know whether it had passed or not. It is assumed that he had been asleep, and this assumption is probably correct. The jury censured the railroad company for requiring this man to work 11 hours a night as operator and switch tender for $1.50 a night. The road deserved censure, doubtless, but the jurymen's reasoning takes a very short cut. Eleven hours may not be an excessive day's work, and $1.50 is not necessarily an unjust rate. Probably some of the roads which have recently shortened the hours and raised the pay of their telegraph operators have not thereby got rid of all their careless men. The more probable ground of criticism in the Norwich case is the man's inexperience and the alleged fact that he used intoxicating liquors. He had held that place only four months. If juries can compel railroads to adopt regulations which will exclude from the service all but well qualified men of good habits and moral character, they will do a good thing, and will at the same time be doing all that is within their power to fulfill their wish that night operators be paid liberal wages. The collision at Northtown Junction, Minn., on the 3d was due to the forgetfulness of men who had been on duty 28 hours or thereabouts. Suits to settle the guilt of these men, and that of the Superintendent for permitting such long hours of work, are now pending in the courts, as has been noted in the *Railroad Gazette* heretofore.

Near Newton, W. Va., on the 8th, four men were killed and two or three others injured while riding on a hand car which was run over and wrecked by a runaway car. It appears that a car being switched at Pickens became unmanageable by the breaking of a brake beam and ran away, and the very high speed at which it ran, on a steep grade, seems to be the explanation why the men on the car got caught. A somewhat similar accident happened on a lumber road near Bradford, Pa., on the 19th, killing three men. A dispatch from Anna, Ill., Oct. 16, reported that a passenger on an Illinois Central train was killed by being thrown off the rear platform when the train went around a curve at high speed. Seven men on a work train were killed by the fall of the false work under a bridge on the uncompleted railroad of the Great Northern, near Wenatchee, Wash. It is said that the bridge had been undermined by a freshet.

Among the minor accidents was one near Belmont, Mass., which, according to the reports, was due to the fact that the crew was short-handed. The conductor says that he had two men, but generally had three. The train broke in two and the rear portion stopped in a hollow. The engineer then started back slowly, but had gone but a short distance when several cars broke away from the engine and crashed against the rear part of the train. While it is quite probable that the accident would not have happened if the train had been fully manned, it is pertinent to inquire why the engineer started back without first having the fireman get on to the car farthest from the engine. The lack of one brakeman is a proper ground for criticising the superintendent, as he should know that enginemen and conductors are quite likely to act in accordance with their cast iron habit, and take no further or different precautions with two men than with three; but it is a poor excuse for the men in charge of the train to offer, for they are bound to see that in the absence of a brakeman extra precautions are taken, even if they lose much time in consequence.

In investigating a slight accident, due to a train running against the buffer stops at considerable speed on the Manhattan Elevated, the officers found that the engineer not only failed to properly control his speed as he entered the station, but also had the boiler so full of water that he could not operate the vacuum brake or even blow the whistle. It will be observed that the record this month shows no injury to persons from derailments caused by defects of equipment. The obstruction of a railroad by drifted sand, which we have heretofore heard of only in the far west, was reported Oct. 29 from Benton Harbor, Mich., where trains were delayed six hours.

Accidents in connection with electric or other street cars were quite numerous in October; 14 of considerable consequence have come to our notice. At Kansas City on the 12th a cable car was struck by a railroad train and four persons killed. The other 13 cases, including collisions between railroad trains and electric cars, rear collisions and butting collisions of electric cars, derailment of electric cars by running over cattle, and other causes, resulted in the death of eight and the injury of 37 persons. At Darby, Pa., on the 29th, two persons in a carriage were killed at a highway crossing, which, though not protected by gates, is said to have an electric bell which gave a good and sufficient warning. Automatic bells need a shotgun attachment.

Lake Coal and Ore Traffic.

This year has been a record breaker in lake ore and coal shipments. The figures for coal are not yet all in; in fact some coal will probably be afloat as we go to press, but Duluth and Superior City will probably receive about 2,000,000 tons of coal this year, which is some 200,000 more than the receipts on any previous year. Freights on coal have closed very high—one dollar to Duluth and 70 to 75 cents to Chicago and Milwaukee. Last year from Nov. 10 to the close of navigation, the rate from Buffalo to Duluth was 10 cents a ton and for some time before that it had not been above 25 cents. A great extension of coal freighting to Duluth is looked for next year.

The total shipments of iron ore, by lake for the year, will amount to very nearly 8,485,210 gross tons as against 8,063,067, an increase of over five per cent. on the previous greatest record. It is not, however, certain that the total shipments from the Lake Superior mines will be as large as in 1890, for that year 940,634 gross tons was forwarded by rail, and it is doubtful if the rail shipments this year will be large enough to equal the total of 1890.

The shipments by ports as given by the *Iron Trade Review*, Cleveland, for the three years were as below in gross tons:

	1892.	1891.	1890.	Gain 1892.	Loss. 1892.
Escanaba	4,000,000	3,088,590	3,714,662	941,410	.....
Marquette	993,113	1,056,027	1,077,398	.....	62,914
Ashland	2,227,407	1,261,658	2,123,856	965,749	.....
Two Harbors	1,155,400	890,209	836,063	265,191	.....
Gladstone	105,000	177,806	91,091	.....	72,806
Superior	4,200	.....	.....	.....	.....
Total by lake	8,485,210	6,444,440	8,063,067	.....	.....
Total all-rail	.....	650,541	940 634	.....	.....
Total shipments	.....	7,094,981	9,003,701	.....	.....

Of the above 4,376,010 tons, or 51.5 per cent. passed through the St. Mary's Falls canal; and 6,660,734 tons, or 78.5 per cent., was shipped to Lake Erie ports. The receipts at various ports have been as below for the years mentioned:

Ports.	1887.	1888.	1889.	1890.	1891.	1892.
Toledo	61,739	75,001	82,961	164,295	191,105	139,987
Sandusky	140,600	134,934	196,062	174,596	107,991	49,736
Huron	21,248	4,351	600	1,300	14,910	65,000
Lorain	184,764	197,000	260,000	280,450	286,000	190,400
Cleveland	1,216,423	971,775	1,732,415	1,945,682	1,251,775	1,950,224
Fairport	501,985	61,140	899,121	1,096,408	606,484	906,611
Ashtabula	1,303,999	1,286,530	1,965,490	2,176,530	1,598,785	2,56[illegible],435
Conneaut	.....	.....	.....	.....	.....	1,130
Erie	210,489	240,598	275,780	497 868	380,750	645,230
Buffalo	28,600	240,000	288,0 0	548,000	410 000	197,000
Total	3,430,199	3,703,679	5,896,344	6,874,964	4,999 694	6,660,734

Two new ports will be noticed in the above tables, viz.: Conneaut as a receiving port, and Superior as a shipping port. Two cargoes of the new Mesaba ores have been shipped, one to Cleveland and the other to Fairport. The ore arriving at Cleveland, some of which was so fine that it could be blown off from the hand excited a good deal of interest and samples were taken by Cleveland chemists, which showed it to be a good Bessemer ore. Their analysis show 64.35 per cent. of iron .038 per cent. of phosphorus and .11 per cent. of manganese. As a matter of comparison we add the analysis of 100 cargoes of each kind of ore mentioned by Messrs. Rattle & Nye, of Cleveland, O., as given by Mr. Geo. H. Ely, in his paper presented to the Fifth International Congress on Inland Navigation at Paris last summer:

	Hard Bessemer.	Soft. Bessemer.	Hard non-Bessemer.	Soft non-Bessemer.
Metallic iron	67.55	62.68	67.23	61.71
Silica	2.05	5.90	2.51	6.12
Phosphorus	0.041	0 040	0.147	0.215
Alumina	0.35	2.00	0.27	1.99
Lime	0.08	0.224	0.122	0.186
Magnesia	0.111	0 142	0.141	0.213
Sulphur	0.028	0.03	0.033	0.048
Manganese	0.124	0.44	0.142	0.371
Organic and volatile	0.48	1.78	0.52	1.42

At Escanaba, by working night and day, they succeeded in shipping an even 4,000,000 tons, and Two Harbors this year for the first time passes the one million ton mark, Marquette dropping below this.

As pointed out in the *Railroad Gazette* of Nov. 18, the traffic through the "Soo" canal will this year probably exceed 11,000,000 net registered tons, making three years out of four in which the tonnage of that canal exceeds that of the Suez Canal. Now comes Duluth, asserting that the tonnage passing the canal cut through Minnesota Point for this year also exceeds that of the Suez Canal. As only 8,000,000 tons is *claimed*, this is improbable, but both M. de Lesseps and Proctor Knott should notice the claim, for the unsalted city of the zenith sea will yet make it good. Duluth and Superior City are also entering a claim that they will enter and clear more vessel tonnage in a few years than Chicago.

The satisfactory freight rates, in combination with the expenditure of about $3,000,000 for passenger steamers on the lakes, will probably result in ship-building orders for the winter and spring aggregating fully $8,000,000 in value. All the berths in which steel vessels can be built are said to be full. The two new twin-screw passenger steamers building for the Great Northern Railway at the yards of the Globe Iron Works, Cleveland, are to have quadruple expansion engines and Belleville boilers. Mr. Miers Coryell, of New York, is to have supervision of their construction for the owners. Although it is claimed on the lakes these steamers will not pay, Mr. Hill evidently proposes to have them fast.

The marine disasters on the lakes this season have been numerous and severe, 57 vessels with a carrying capacity of 28,708 gross tons, valued at $1,014,250 have been lost. Of these 12 were burned, 5 were lost by collision and the rest went ashore or foundered. Two of them, the "Western Reserve" and "Gilcher" have been written of and their loss, accompanied by great mortality, will probably lead to a better system of construction. Heretofore the steel and iron vessels built on the lakes have been made very strong against such shocks as come from emptying pockets of iron ore into their holds and from taking the ground and boulders in the shallow channels which beset a passage through the lakes. The loss of the "Western Reserve" seems to have proved that some, at least, lacked longitudinal strength. It is well these losses occurred before the new passenger boats were built.

Our production of pig iron for the first half of this year, according to Mr. Swank, was 4,799,056 gross tons, and, taking the furnace capacities as returned by the *American Manufacturer* as our guide, the approximate production to the 1st of November added over 2,800,000 tons to the make for the first half of the year. This makes it probable that our production for this year will not be much over 9,000,000 gross tons or under 8,900,000 tons, as compared with 9,202,703 gross tons for 1890, 8,279,870 tons in 1891 and 9,710,819 for the fiscal year ending with Jan. 30, 1892. The make of Great Britain has been for 1890, 7,904,214 gross tons; 1891, 7,228,496 tons, and for the year ending with June 30 it was 6,307,027 tons. It is not probable that they will make as much pig iron in 1892 as last year. Somewhat over 28 years ago a distinguished authority on iron in this country said, in the course of a lecture, that England had in the past been making one-half the world's supply of pig iron, and predicted that she would continue to produce such a share. The statement was true; but a good many more tons of pig iron are now made in this country than then, and the prediction was false, our metallurgical engineers having revolutionized the smelting of iron and its conversion into Bessemer steel. Taking our population at 65,000,000, we shall undoubtedly use 310 lbs. of iron per capita this year of suspended railroad maintenance and restricted railroad building.

An association of road foremen of engines is proposed by a committee which recently met at Chicago, and a meeting is to be held in New York City on Jan. 9 to see what can be done toward forming such an association. The Chicago meeting was attended by men from the

Lake Shore, the Pittsburgh & Lake Erie, the Michigan Central, the Chicago & Erie, the Chicago & Grand Trunk, the Pennsylvania, the New York, Chicago & St. Louis, the Chicago & Northwestern and other roads. The chairman of this committee is C. B. Conger, late Mechanical Engineer of the Michigan State Railroad Commission, and the New York representative is John A. Hill, editor of *Locomotive Engineering*. The January meeting is to be held at his office, 5 Beekman street. All road foremen, or men doing that kind of work, are invited to come to the meeting. Such an organization can do much good. The locomotive is the main spring of a railroad and the men who run locomotives are correspondingly important. But some of the most startling train accidents that worry railroad managers and scare passengers are due to the negligence of ill-trained enginemen; this lack of training comes from the inability of the division superintendent to keep in touch with the runners: and the road foreman, whose place it is to make up for this deficiency in the organization, therefore becomes a man of consequence. He is the medium of communication between the most important officer and the most important employé. He should be capable of the mental concentration of the man who can run an engine 25 years and make no mistake (but who knows nothing outside of his work), while at the same time he needs the breadth of view of a chairman of directors. There are far too few road foremen, and it will therefore be a good thing if they succeed in magnifying their office by any or all legitimate means. Like all the rest of us they will have to devote their conventions largely to the sordid matters of life, such as saving coal, and even when this is out of the way they will doubtless be inclined to discuss the construction and management of engines more than the art of not overlooking signals, but security of life is above economy in running, nevertheless; and it is right for the road foreman to think of his duty to the superintendent first and of his duty to the master mechanic second, notwithstanding the importance of the latter. As we recently remarked in another connection, sentiment still rules in railroad affairs to a considerable extent. If we were to venture anything in the way of advice to the organizers of the proposed association we should urge the importance of aiming at perfection in commonplace things. The chief end of a convention should not be to exhibit blue prints of new patents on mechanical devices that were discarded before the flood (and try to make believe that the things themselves are new), but rather to interchange ideas. The ideas presented should be those of the members themselves, not those of upstarts who have succeeded in gaining a member's confidence; and should be those which are of most vital importance in their work.

The well known and long standing litigation between the people in the State of Illinois, the city of Chicago and the Illinois Central Railroad, regarding the ownership of the lake front, is at last finally decided, as will be seen by a report in another column. In 1883 the Circuit Court, by Justice Harlan, decided in favor of the city of Chicago. The Illinois Central appealed from this decision to the Supreme Court of the United States. This court, after reviewing all of the complex litigation and legislation affecting it, has awarded the title in fee to all the lake front to the State of Illinois, in trust for the city of Chicago, subject only to the Illinois Central's right of way upon a strip, 200 ft. wide, and some other ground of moderate dimensions which has been filled in by the Illinois Central, and which does not encroach upon navigable waters. The strip of lake front affected by the decision extends the entire length of the city, about 25 miles, but the part which has been occupied by the Illinois Central is only about six miles long, extending from the river southward to Hyde Park. The value of this property, which is now made available to the city of Chicago depends, of course, upon the use to which it is put. It has been estimated as low as 50 and as high as 200 millions of dollars by various people acquainted with the conditions. Taken together with the right to fill in the lake for about a mile from the present shore the property is exceedingly valuable if devoted to shipping interests. So far the city has not shown a disposition to permit the lake front to be used for any such purpose, but instead there has been a strong sentiment in favor of devoting it to park purposes for the benefit of residents and the public generally, as distinguished from the commercial interests of shippers. For park purposes it is not worth a vast sum, at least not any such sum as it is worth for shipping interests. The Mayor has decided to make a thorough examination of the rights of the city in the use of this property, and will commence at once to collect all possible revenues, which at this time are sadly needed for public improvements, the police force, and the preparation of the city for the World's Fair. This decision of the Supreme Court is of great interest to all Westerners, and of unusual import to the people in the city of Chicago. Much satisfaction is expressed with the decision by lawyers acquainted with the evidence and legislation affecting the decision.

The Erie road is spending a few hundred dollars in posting its New York City ticket sellers concerning the World's Fair, which will, doubtless, be amply repaid in business next year. On Dec. 10 a dozen of the agents in New York and vicinity will go to Chicago for the purpose of making themselves familiar with the location and arrangement of the Fair grounds and buildings and the best ways of reaching them. The trip will take from five to seven days. This would be the ideal way of training all ticket sellers, of course. To secure a passenger, who may go by a competitor's road, it is desirable and somesimes necessary not only to tell him all the advantages of your route, but to cultivate his taste, so to speak; and the Erie ticket seller should be able to present the advantages of his line so vividly as to convey the idea that every agent and conductor on the Erie lines can conduct the passenger to every point in the World's Fair grounds with his eyes shut. The passenger will then be sure to select that line of course. It will be remembered that the Pennsylvania and other roads recently spent considerable sums in carrying several hundred ticket agents over their respective roads. It cannot be doubted that this money was much better spent than a good deal that goes for other kinds of advertising. "Seeing is believing," with ticket sellers as well as other people. The late Edward Gallup, when he was a passenger agent in the East, deemed it worth while to announce in his circulars for westbound passengers that he had had the advantage of a residence in the West. Getting the confidence of the passenger is half the battle, and the ability to give full and accurate information is a chief means to this end.

The Chicago & South Side Rapid Transit (elevated) road, whose regulations were noticed in the *Railroad Gazette* last week, has already had occasion to apply its discipline, and at one of the most vital points. A number of locomotive engineers were found to have been trying to create dissatisfaction among their fellows and they were dismissed. They got Mr. Arthur to come to Chicago and on his advice application was made to have the justice of the dismissal referred to a "board of review."

President Barnard agreed to this and the board was adpointed. It consisted of three officers of the road. It reported that nine enginemen had in conversation injuriously criticised the management of the road and confirmed their dismissal. Seven conductors who joined these enginemen in a secret meeting which was designed to promote federation with the men on the cable railroad, were reinstated, it being held that they were deceived by the enginemen and were not really instigators. While the mischievous talk of the engineers was the first and most definite point against them, and the one which most distinctly violated the rule of the company (No. 1), the secret meeting was evidently the offense which was regarded by the road as most grave. Press dispatches have indicated that Mr. Arthur fully approved the decision of the board. Inasmuch as the men, when they met in secret, were in a sense only exercising their right of combining, this has caused some surprise; but the explanation is doubtless to be found in Mr. Arthur's disapproval of federation between engineers and brakemen, street car men and other such classes.

The Chicago, Rock Island & Pacific has publicly exposed a trick which has been many times played, and it is to be hoped that General Manager St. John's example will infuse courage into other managers. In receiving a committee from the Order of Railway Telegraphers, who asked that the wages of Rock Island operators be raised, he informed them that he had learned that they did not really represent the men on the road, and politely bowed them out. Among other things he said:

"The position occupied by the officials of this company toward its employés is that of a desire to do justice to all. There is no employé of the company but knows from past experience that this is so. There is no man in its employ but knows that if he has, or thinks he has, a grievance, and in presenting it to his immediate superiors does not obtain the satisfaction to which he thinks himself entitled, can continue presenting it until he reaches a decision at the hands of the highest official of the company. It is quite unnecessary however, for any committee to announce its presence by telegrams containing threats of what it proposes to do in advance of any conference; and that this has been the case in your advent to our city has led to the belief that you were not a representative committee, supported in your actions by the men in whom the company has ever had confidence, and whom you claim you are here to legislate for. Investigation shows that our suspicions were true, and we have the statement in writing, signed by the men themselves, that such is the case, and the signatures represent a large majority of the operators in our service. . . . We shall await the coming of another committee, if that is desired by our operators, which shall be representative of the majority.

The rail mill of the Bethlehem Iron Co. shut down last Tuesday for want of orders, and the silly story was immediately started in some of our daily and over-zealous contemporaries, that it was for want of confidence in the in-coming administration. If those journals had known that the great Edgar Thomson rail mill decided to stop rolling rails some time before the election, they would probably have said that it was due to want of confidence in the voters. It is a fact, however, that those mills made that decision before election and went to making billets, and we are told that to day there are but two mills actually rolling rails in the country. If that is not strictly true, it is probably not far from true. Everybody who knows anything about the subject, knows that the history of the rail trade for many months has been one of great depression. All of the prophets have been confounded over and over again by the refusal of railroads to place orders for the rails. What it means, and when the depression will end, nobody can tell. Undoubtedly the case is, like most human affairs—complicated. At the same time the Steel Rail Association refuses to reduce prices, and perhaps the railroads think that they can hold out as long as the rail makers can.

According to the *Northwestern Lumberman*, it appears that the extraordinary demand in the Missouri and Upper Mississippi River states for Puget Sound shingles has led to the establishment of too many saw mills, and that some of these, whose proprietors ran into debt to start, are now on the point of failure. It appears that the business has been tremendously rushed and the local newspapers print stories of whole train loads of shingles going to points in the regions of Omaha and Sioux City, points which, it is to be remembered, are about *two thousand* miles from the forests whence the shingles are shipped. The Northern Pacific has recently appealed to the shippers not to send shingles except to parties who will unload them, 2,000 cars of that company having been practically held as store houses in the East—that is, the Mississippi Valley—on account of large shipments having been made with the hope of selling the goods after the cars arrived. The *Lumberman* says that, notwithstanding the failure of the mills which were put up under unstable conditions, the legitimate business is all right, and that one firm in Omaha is now inquiring for 500 carloads to be delivered next spring.

The story is that the new Pennsylvania, fast, compound locomotive, No. 1,515, will be fitted for burning oil fuel. There is no doubt that this has been talked of by the motive power officers of that company, but we understand that no decision has been reached. The experiments of the Pennsylvania Railroad, in 1887, showed conclusively the entire practicability of burning oil in ordinary service. The question is merely a commercial one and not mechanical, and there is no reason why No. 1,515 or any other engine should not be fitted up to burn oil fuel; but there is very great reason why the entire locomotive equipment of any large railroad in the United States should not be so fitted. The Pennsylvania railroad alone would need for its engines over one-third of the total oil produced in the United States, and under present conditions no railroad could afford to put itself where it would have to buy its fuel of the Standard Oil Co. If 1,515 is to be fitted for oil burning, it is probably partly for experiment, and largely for fame.

NEW PUBLICATIONS.

Modern Locomotive Construction. By J. G. A. Meyer, M. A. Soc. M. E., New York: John Wiley & Sons, 1892.

This volume gives very full and detailed directions and methods for proportioning the various details of locomotives, the rules being in all cases expressed in simple language and easily understood. The book is also well and profusely illustrated, containing over 1,000 cuts, chiefly of locomotive details, and as these are reduced from working drawings in most instances and are very fully dimensioned their usefulness will be apparent to all concerned in the design of locomotives. A large number of rules are given for computing the dimensions and proportions of various parts of different classes of locomotives, and this subject is further elucidated by some 80 tables giving the diameter of piston rods, cross head pins, thickness and depth of side rods, etc., etc., for engines with from 9 to 22 in. cylinders and various pressures of steam. These tables might, however, have been condensed with advantage.

While the book is in the main admirable and calculated to be very useful, it can hardly claim to be a complete treatise on the construction of the modern locomotive, and many points of the best and latest practice are either omitted or treated in a very cursory manner, whereas it is precisely on these novel points that information is most needed. The tendency of present practice is in the direction of compound locomotives, efficient safety tire fastenings, wrought iron centres for driving wheels, double butt straps for the longitudinal joints of boilers, the enlargement of axles, especially when of steel, in the wheel fit and many other similar points, which are hardly mentioned in the work under review.

The permissable weight on each driving wheel in proportion to the weight of the rail, is also a very important factor which must be settled before the design of an engine for heavy service can be commenced. All the assistance the work under review gives is contained in the following sentence: "When an engine is running on light rails, about 30 lbs. per yard, we may place 4,000 lbs. on each driver and when an engine is running on heavy rails we may place 15,000 lbs. on each driver." This will afford but little light to the unfortunate designer who, for example, has to build an engine with the maximum possible power for a 62-lb. steel rail, supported on 2,200 white oak ties per mile, with gravel ballast and 4-bolt angle splices. Would the author call this a heavy rail? Mr. Meyer, however, errs in good company, for an excellent authority on the locomotive is even more vague, merely stating, "The amount of weight which can be carried on a single wheel depends upon the material of which the rails are made and to some extent

on their form or size or as the latter is usually expressed, on their weight per yard." There is, however, an authoritative expression of opinion on the point to be found in the records of the proceedings of the American Railway Master Mechanics Association, though it has not yet been announced that it is indorsed by the American Society of Civil Engineers or other kindred body representing track interests. In a report on locomotives for heavy fast freight and passenger service printed in the proceedings for 1891, one of the queries in the circular of inquiry sent out by the committee was as follows:

"Q. No. 7. What is the limit of weight one driver should take?"

"A. No. 7. The general answer is 16,000 lbs. for rail under 60 lbs. and 18,000 lbs. for rail above that weight."

This appears to agree with modern practice, and while somewhat general, is at any rate more definite than the statements quoted above from works on the locomotive.

Cab and Caboose; The Story of a Railroad Boy. By Kirk Munroe. pp. 284, 8vo., with illustration. New York: G. P. Putnam's Sons, 1892. $1.20.

A lad is driven to run away from home by such stress of circumstances that the act is very creditable to his spirit, and he decides with great promptness to become a "railroad man." He makes his way with startling rapidity, through a series of adventures and tribulations that would have tested the fortitude of Grant and the courage of Custer. At the end of the story he is private secretary to the President, still has all of his limbs, and will probably marry the President's daughter. Many of his experiences are events that have actually taken place in very recent times. For instance that startling and picturesque express car robbery on the New York Central by young Perry last winter, with all of its bold incidents figures in the story, with Rod, the young railroader, as its hero. Compound locomotive 385 of the Jersey Central is brought in, too, and breaks its own marvellous record for speed. The story is not without useful information about railroad life, and it has so much romance and adventure, and is told with so much spirit that it is sure to interest the normal boy and the fortunate man who still keeps his sympathy with boys.

TRADE CATALOGUES.

Illustrated Catalogue of the John A. White Co., Dover, N. H.—The catalogue just issued by this company is devoted entirely to word-working machinery. It is intended to show the latest and most popular designs only, and does not include considerable special machinery designed to meet peculiar needs of different customers. Last January the company took over the business that had been carried on at Concord, N. H., for 20 years by Mr. John A. White under the name of the Concord Machine Works. It has since that date absorbed the business of the Concord Machine Co. The whole plant has been overhauled and considerably enlarged, and the company now feels itself in a position to turn out machines second to none in design, material and workmanship. The catalogue is very finely illustrated by wood-engravings, showing pretty nearly everything required in a wood-working shop.

Courts Will Not Force Witnesses to Answer the Interstate Commerce Commission.

Judge Gresham, in a decision rendered at Chicago Dec. 7, has refused to compel witnesses to appear before the Interstate Commerce Commission, declaring unconstitutional that provision of the law which requires such action. The case was that of W. C. Brinson, David Brown, L. Hopkins, Henry Walker, W. R. Stecking and others, who last July refused to answer certain questions propounded by the Interstate Commerce Commission. Under the twelfth section of the act District Attorney Milchrist brought a petition before Judge Gresham to compel the production of the books and the answer of the questions. Judge Gresham, in a long opinion, refuses to grant the petition, holding that the court could not be made subsidiary to or a subordinate auxiliary to a non-judicial and administrative body. This is the case in which the Chicago & Grand Trunk, the Calumet & Blue Island, Chicago & Kenosha, Joliet & Blue Island, Chicago & Southeastern, Milwaukee, Bayview & Chicago, Baltimore & Ohio, Chicago & Eastern Illinois, Chicago & Erie, Michigan Central, Lake Shore and other roads were accused of unjust discrimination in favor of large Chicago shippers, notably the Illinois Steel Co.

"The commission was engaged in investigating charges of unlawful discrimination against certain railroad companies," said Judge Gresham "and this court is asked to aid that body in obtaining evidence which it is claimed will tend to support the charge. The subject of the inquiry is not brought here for adjudication, and this court can exercise no discretion beyond deciding whether the evidence demanded is pertinent to the charge and within the general scope of the twelfth section of the act. Congress cannot thus make a judicial department the mere adjunct or instrument of either of the other departments of government. Undoubtedly Congress may confer upon a non-judicial body authority to obtain information necessary for legitimate governmental purposes, and make refusal to appear and testify before it touching matters pertaining to an authorized inquiry an offense punishable by the courts, subject, however, to the privileges of witnesses to make no disclosures which might tend to incriminate them or subject them to penalties or forfeitures. The prosecution of an action for violation of such a statute would clearly be an original suit or controversy between parties within the meaning of the Constitution, and not a mere application like the present for the exercise of the judicial power in aid of a non judicial body. So much of Section 12 as authorizes or requires the courts to use their powers in aid of inquiries before the Interstate Commerce Commission is unconstitutional and void, and the application is dismissed for want of jurisdiction to entertain it"

District Attorney Milchrist at once gave notice that he should apply for a review of the case by the Supreme Court.

TECHNICAL.

Manufacturing and Business.

The Millard Refrigerator Co., of Kansas City, has filed its charter in Kansas to build cars under patents of Martin S. Millard for improvements in refrigerator cars. The first directors are: John Porter, John H. McEwen, J. S. Woods and Edward Comfort, Kansas City, Kan., and Martin S. Millard, of Kansas City, Mo. The capital stock is $200,000.

The Hadduck Railway Material Co., of Chicago, has been organized with a capital of $20,000 by Frederick W. Moore, Glen E. Plumb and F. W. Pringle.

The Mills Pneumatic Gate Co. of Chicago filed a charter last week in Illinois with a capital stock of $200,000, with F. W. Mills, H. S. Mills and Edward Arnold as incorporators.

The Link Belt Engineering Co., of Nicetown, Philadelphia, reports among large contracts now in hand machinery for the Dodge Coal Storage Co.'s plant for the Pennsylvania at South Amboy, N. J. The Company has recently completed a large coal handling and storage plant for the Maryland Steel Co., Sparrow's Point, Md.

Among the notable exhibits of machinery at the Mechanics' Fair, in Boston, is that of the John A. White Co., of Dover, N. H., whose exhibit occupies a prominent position in the basement of the main building. Among these machines is a band re-sawing machine which has many features of superiority peculiar to this machine. Unlike most machines of this class, the feed rolls may be given a speed varying from 12 to 40 ft. per minute This is accomplished by means of a friction device belted to the rolls and consisting of two bevel discs, between which the belt runs, one of which is fixed, the other being movable on the shaft. By means of a hand screw, the position of the belt on the discs may be changed at will, and any desired speed of rolls obtained. The attachment carrying the feed rolls is entirely independent of the table; and may be swung back entirely out of the way, permitting the use of the machine as a band saw or re-saw, as may be wished.

Messrs. A. M. Kidder & Co., of New York, and the National Exchange Bank and the American National Bank, of Hartford, are authorized to offer for subscription at par $1,250,000 of the eight per cent. cumulative preferred stock of the Pratt & Whitney Co., of Hartford, Conn., one of the largest and most widely known manufacturers of machinery and tools in this country. The business has been established over 30 years. The authorized capital is $3,000,000 divided into 10,000 shares of common and 20,000 shares of preferred, of $100 each, 2,500 shares of which remain in the treasury. No bond or mortgage can be put upon the property except by consent of 90 per cent. of the preferred stockholders. The total assets exclusive of patents and good, will amount to $2,134,000 being $384,000 in excess of preferred stock now issued. The average annual earnings of the three last years, equal eight per cent, on the preferred and 10 per cent. on the common stocks. The present managers agree to remain for a period of five years. The subscription books will open Dec. 15 and close Dec. 17. Full particulars can be seen in our advertising columns.

Iron and Steel.

The Tudor Iron Works Co., of St. Louis, Mo., is erecting an additional rolling mill 120x60 ft.

The machinery for the South Boston Iron Works, Middlesborough, Ky., will soon arrive and be placed in the new factory, which has been completed.

The Taylor Iron & Steel Co., of High Bridge, N. J., will enlarge its foundry.

The Calumet Steel & Iron Works, on the Calumet River, near Cummings, Ill., have been sold to a syndicate of Cleveland men and work will be resumed in the plant, which has been idle for the last year. A. M. Wilcox, of the firm of Cleveland, Brown & Co., has been elected President. Associated with him are Charles Stewart, P. M. Hitchcock, Richard Brown, C. S. Wilcox, of Cleveland.

New Stations and Shops.

The Great Northern is at work on a brick and stone passenger and freight depot at Kalispell, Mont. The foundations are complete and the superstructure will be erected as soon as possible.

The city of Ogden, Utah, has agreed to give the Central Pacific land for the location of large shops at that city and a money subsidy, and it is reported that the agreement for the transfer of the present shops at Carlin and Terrace was signed by the city authorities and railroad officers last week. The company agrees to erect a machine and blacksmith shop, 80x254 ft., an office and storeroom, 30x110 ft. and a 16 stall round house, and give employment to 200 men, the shops to be in operation next year.

The Nicaragua Canal.

A National Convention met at New Orleans last week to consider means of furthering the construction of the Nicaragua Canal. There were delegates present from nearly all parts of the United States, and a good many eminent and distinguished men took part in the proceedings. The purpose and result of the meeting were to organize public opinion and influence for the purpose of securing national aid to the project. An executive council was formed representing many of the states, and a committee was authorized to work at Washington this winter.

The Cape Cod Canal.

A new canal company is to be organized in Boston with Professor Thomson and the following gentlemen as incorporators: M. P. Kennard, Sub-Treasurer of the United States; R. E. Demmon, President of the Howard National Bank of Boston; W. L. Candee, of Brookline; ex-Gov. Oliver Ames, B. J. Berry, of Lynn, and Thomas Appleton. The purpose is to build a canal between Yarmouthport and Dennis, using the basin of Bass River, which flows inland for about five miles. From there they will cut the canal through the marsh for three miles, which will bring them to the sea. The canal will be 200 ft. wide and 26 ft. deep. It is said that Professor Thomson is at work on plans for cable towing. He will also contrive a plan for the lighting of the canal throughout the entire length by electric lights. This company will apply for a new charter on the assembly of the Legislature, but will not ask the state for aid.

Boiler Explosions.

There are indications that the frequent explosion of locomotive boilers on the Reading will be made the subject of legislative investigation at Harrisburg. The reader will doubtless have noticed that within the last two years that road has had an abnormal number of accidents of this kind.

An Electric Excavator.

There is in use at the works of a brick company near Chicago an electric excavator, which, we believe, is the first of its kind. It is used for excavating clay in the clay pits, for which a steam shovel was used until recently. Electricity was substituted for steam by disconnecting the steam engine and substituting for it a 50 H. P. Thomson-Houston motor, which is supplied with current from a generating station several hundred feet away. Feeding wires are run from the generating station to the edge of the bank, where they are connected to a pair of trolley wires arranged so that they can be moved from time to time as the shovel advances. The motor is suspended under the car on rubber cushions and is geared to a countershaft, which is in turn geared to the hoisting drum by a friction clutch. The countershaft is also connected with the mechanism for operating the boom.

World's Fair Whaleback.

The World's Fair whaleback steamer "Christopher Columbus" was launched on Dec. 3 at the yard of the American Steel Barge Co., West Superior. This steamer is 362 ft. long over all, 42 ft. beam and 24 ft. deep. The engines are to be of the triple expansion type and are being built by Messrs. S. F. Hodge & Co., of Detroit. The cylinders are 24, 42 and 70 in. diameter. The passenger accommodations will be almost wholly on a saloon deck which extends over the greater part of the length of the ship, and is supported by seven turrets and a number of ventilating shafts. There is a promenade deck above, 225 ft. long and 30 ft. wide. Ample provision in the way of heating and lighting and in dining and refreshment rooms is made. The ship has a double bottom, having a capacity of 730 tons of water ballast, and is provided with nine watertight transverse bulkheads, as well as longitudinal bulkheads. The accommodation will be sufficient for about 5,000 passengers, and this is said to be the largest vessel on the lakes. It will carry passengers between the pier in front of the Auditorium Hotel and the fair grounds, and run from dock to dock, seven miles, in half an hour.

THE SCRAP HEAP.

Notes.

Hon. L. S. Coffin states that he has, during the past year, spent $1,000 for white buttons, which he has supplied to railroad men to be worn as total abstainer's badges.

The telegraph operators of the Central of New Jersey have secured a readjustment of wages and regulations, under which some in the lower grades have received an increase of pay. It is said that the company has had telephones put into many of its stations so as to be prepared to communicate without the aid of Morse operators. The Chesapeake & Ohio has raised the pay of some of its telegraph operators.

The Georgia House of Representatives has passed bills making the "wrecking" of railroad property a felony; limiting the issue of stock and bonds and the creation of floating indebtedness by railroad companies; and also one intended to prevent speculators securing possession of the controlling interest of railroads and the overriding the interests of minority holders.

South Carolina's Legislature passed a bill prohibiting the acceptance of free passes by legislators and state officers, when Gov. Tillman and his aspirants came into power, that having been one of the issues argued in the campaign. Now a movement has been started to repeal this law.

The annual report of J. E. White, Superintendent of the United States Mail Service, shows that mail crews ran 149,251,446 miles during the last year, and distributed 9,245,994,775 pieces of mail matter, an increase of 7.37 per cent. over the previous year. The record of errors shows only one error in 5,466 pieces handled, the best record in the history of the service. The men on the cars now prepare a good deal of mail matter for immediate city delivery, this work having been 28 per cent. greater, as respects letters, than in the previous year. Of papers 61 per cent. more were assorted. During the year there was an increase in railroad service of 3,008 miles, or 1.95 per cent., while the lines upon which service was performed by clerks increased 3,346 miles, or 2.38 per cent. During the year five clerks were killed and 60 injured.

World's Fair Notes.

The erection of heavy machinery in Machinery Hall is progressing rapidly. The pumping plant of a capacity of 40,000,000 gal. per day, which is being put in by Henry R. Worthington, is the most notable feature.

The large electric transfer table in the Transportation Building, which was built by the Industrial Works of Bay City and of which we have already published some description, is very nearly completed.

The allotment of space in the departments of Mines and Electricity has been completed. The allotment in the departments of Manufactures and Liberal Arts has been delayed on account of the doubt in regard to the construction of an educational building. This building has now been authorized and will be erected near the Forestry building, but the disposition of space in it is still in doubt.

Grade Crossings in Massachusetts.

Albert F. Noyes, M. Am. Soc. C. E., Chief Engineer of Newton, Mass.; Charles A. Allen, M. Am. Soc. C. E., of Worcester, Mass., and George S. Rice, M. Am. Soc. C. E., of Boston, have been appointed a commission to report on the matter of abolishing grade crossings in the city of Newton on the main line of the Boston & Albany Railroad. There are 12 grade crossings on the Boston & Albany main line in Newton; also eight crossings on the circuit line, which have not yet been considered.

The Brooks Works' School.

The technical school connected with the Brooks Locomotive Works at Dunkirk, N. Y., reopened for the season on Monday evening, Nov. 14. There were in attendance at the opening session 79 pupils, and application for admission had been made by several more. M. L. Hinman, President of the works, in a brief address explained the object in the mind of the late H. G. Brooks when in January, 1883, he founded the school, and said that his successors were to carry it on because of the belief that with the improvement of mind brought about by the educational opportunities here provided there would be produced a class of workmen both better mechanics and better citizens. The school will be under the supervision of Alfred Solano. We have described this school fully in past issues.

The Improvements at Elizabeth.

Work on the Pennsylvania elevation at Elizabeth, N. J., is progressing steadily. The trestle for the eastbound tracks is about all up, except a small section near the Central of New Jersey crossing, and the stringers in place ready for the rails. During the past week the foundations for the crossing bridges at West Grand and Magnolia streets have been completed and several courses of the stone work have been laid for the abutments of the Pearl street bridge. No change has been made by the railroad company in the plans for the Broad street and Morris avenue crossing from those originally accepted by the city, except to carry the foundations some 10 ft. deeper to allow for the possible depression of these streets under the tracks of the Central of New Jersey at this point.

Improving Savannah Harbor.

The work of improving the harbor of Savannah, which was discontinued in 1891, has been resumed. July 22, 1890, the Secretary of War approved the project having for its object obtaining a depth of 26 ft. of water from the city to the sea, and Sept. 19 of that year Congress appropriated $350,000. Last July an additional sum of $318,000 was authorized by Congress, and contracts for additional work were let last month. It is calculated by Captain Carter, Engineer in Charge, that $70,000 will be expended in December, and that the entire appropriation will be used up by next March. He estimates that the result aimed at—a depth of not less than 26 ft. between the city and the sea at high water—could be secured in two and a half years if the estimated sum of $2,700,000 were available in a lump.

Extension of Ore Docks at Two Harbors, Minn.

There are three projects under consideration for increasing the facilities of the ore docks of the Duluth & Iron Range at Two Harbors, Minn. The first is to extend No. 4 dock 500 ft.; second, to build 500 ft. of No. 3, and the third, to build complete No. 3 dock. The increase in capacity under the first proposition would be 84 pockets of 180 tons each; in the second 90 pockets, and in the third 168 pockets. It is probable that 500 ft. will be added to No. 4, and that No. 3 dock will be built complete, 1,000 ft. long. This would just about double the present capacity of the plant, adding 252 pockets with a combined capacity of 45,360 tons. Bids have been invited and the award will be made about Dec. 10. The figures submitted by the contractors will have much to do with determining how much of this work will be done this year.

There will be so large an amount of dimension lumber required that it may be impossible to secure all that will be needed to complete the entire work, and if it is found to be unusually scarce the figures will be so high that part of the work will be laid over for a year. There will be used, depending upon the amount of work done, from 6,000,000 to 8,000,000 ft., board measure of dimension lumber and from 4,000 to 6,000 piles.

This enlargement of facilities is to be employed exclusively in handling ore from the Messabe iron range and the officials of the company say they anticipate a total shipment from this range during the season of 1893 equal to the tonnage from the Vermillion range during the one just closed. These shipments were 1,055,498 tons.

Rivers and Harbors.

Congressman Blanchard, Chairman of the River and Harbor Committee, says there will be no appropriation for new work this session of Congress. Some $16,000,000 will be put into the bill for sundry civil appropriations to continue the work already under contract. Secretary Foster's estimates for the next fiscal year contain items of $35,000 for buoys and lights at Chicago, and he recommends the following appropriations on the lakes: Continuing improvements on St. Mary's River, $2,000,000, and on Hay Lake Channel, $500,000. An appropriation of $1,000,000 for the 20-ft. channel between Duluth, Chicago and Buffalo is also recommended.

CAR BUILDING.

The Mount Vernon Car Manufacturing Co., Mount Vernon, Ill., is building 150 coke cars, 100 box cars and 10 cabooses for the Monterey & Mexican Gulf road.

The Michigan-Peninsular Car Co., is building 1,500 coal cars of 30 tons capacity for the Columbus, Hocking Valley & Toledo. The cars are equipped with air brakes and automatic couplers.

The Laconia Car Co. has orders at present for about 450 freight cars, and is also building a number of passenger and tourist cars. The number of men employed will soon be increased to 600.

The Billmeyer & Small Car Works of York, Pa., have shipped the sixth car load of gondola cars to South America via New York, for use on the Central San Antonia road. The company has also received a large order for first-class passenger coaches from the Illinois Central.

The Wagner Palace Car Works at East Buffalo are employing 1,800 men, and orders have been given to further increase the force this month. All of the old cars are being overhauled as fast they go into the shops, and new cars are being turned out rapidly. The company has, during the year, added about $40,000 worth of improvements.

The articles of incorporation of the Canda Cattle Car Co. were filed in New York this week. The directors are Charles S. Fairchild and Valentine P. Snyder, of New York; Joseph L. Caven, of Philadelphia; J. Willcox Brown, of Baltimore, and A. G. Loomis, of Hartford, Con. The capital stock is $800,000, of which $750,000 is preferred stock.

A large order for logging and lumber cars has been recently given by the Northern Pacific to its shops at Edison, Wash., and Superintendent of Motive Power Hickey states that other orders are contemplated. An order has been issued that the repair work on all locomotives and cars west of the Rocky Mountains be done at the Edison shops. This will necessitate a large increase in the shop force, which now numbers over 400 men.

BRIDGE BUILDING.

Baltimore, Md.—Bids for the proposed new bridge over Jones' Falls, on the line of Baltimore street, were opened at the Mayor's office this week. They are as follows: Youngstown Bridge Co., $35,684; Massillon (O.) Bridge Co., $35,850; Variety Iron Works, Cleveland, $36,125; Pittsburgh Bridge Co., $36,300; Campbell & Zell Mfg. Co., Baltimore, $36,800; Pennsylvania Bridge Co., Beaver Falls, Pa., $36,900, Wm. C. Lewis, agent, $37,000; Bartlett Hayward Co., $37,800; Columbian Iron Works, $48,892. The bid of the Youngstown Bridge Co. is the lowest, but it has not yet been decided to award the contract to that firm, and it may be given to the lowest Baltimore bidder, Campbell & Zell Mfg. Co.

Bessemer, Col.—The town council of Bessemer, Pueblo County, Col., is arranging its finances to build a viaduct across the railroad tracks. Bids have not yet been asked.

Birdsboro, Pa.—The Wilmington & Northern Railroad is preparing plans for a large iron bridge across the Schuylkill River at Birdsboro.

Buffalo, N. Y.—The Board of Public Works opened bids last week for a bridge over Scajaquada Creek, on Elmwood avenue, the bridge to be either stone or iron. The bids are as follows: For stone, W. A. Green, of Buffalo, $85,000; Charles E. Williams, of Buffalo, $91,190; John Mumm, of Buffalo, $95,775; George Parks & Sons, of Buffalo, $117,067. For iron, Buffalo Bridge & Iron Works, $97,000; Kellog Bridge Co., of Buffalo, $97,200; Parker Bridge Co., $97,500; Berlin Iron Bridge Co., $97,900; Owego Bridge Co., $100,000; King Bridge Co., of Cleveland, $101,000; Pennsylvania Bridge Co., $104,000; Variety Iron Works, of Cleveland, $106,700. The lowest bidder for the stone bridge being W. A. Green his bid will probably be accepted. The new bridge will be a double-span structure over 400 ft. long and 58 ft. wide. The driveway will be 42 ft. wide, with 8 ft. walks on each side. Already $75,000 has been raised by tax for the bridge.

Chicago.—An ordinance has been introduced in the City Council authorizing the construction of a viaduct by the Pittsburgh, Ft. Wayne & Chicago over its tracks at Fifty-first street. The property owners and Mayor Washburne have been opposed to the building of a viaduct, but it is said that a compromise has been reached.

Crookston, Minn.—The Edge Moor Bridge Works have completed the erection of the bridge for the Great Northern across the Red Lake River.

Easton, Pa.—The new double-track bridge of the Central of New Jersey over the Delaware River at Easton was opened Dec. 2. The old bridge was for single track. The bridge is 1,020 ft. long and has seven deck spans. It was built by the Phœnix Bridge Co. The double-track iron bridge of the Lehigh Valley, which has been used by the Central of New Jersey, is to be rebuilt, and the Lehigh Valley trains will use the new bridge of the Central of New Jersey.

Lowell, Mass.—A petition for a new bridge over the Merrimac River, between the Aiken street and Pawtucket bridges has been referred by the Common Council to the joint Committee on Streets.

Minneapolis, Minn.—The Great Northern has let the contract for the erection of the highway bridge at University avenue to the Edge Moor Bridge Works.

Montgomery, Ala.—The Montgomery Bridge Co. has been chartered by D. S. Troy, W. A. Gayle, C. E. Hails and C. Armstrong to build a wagon, foot passenger and railroad bridge over the Alabama river near Montgomery. The capital stock is $150,000.

Pueblo, Col.—The city of Pueblo and the county commissioners jointly will soon advertise for bids for the construction of a viaduct over the railroad yards on West Fourth street. The city authorities also contemplate building a viaduct over the railroad yards on South Main street.

Reading, Pa.—Cofrode & Saylor have secured the contract to build the superstructure of the Schuylkill avenue bridge at Reading, at their bid of $22,470. This firm will build bridge works adjoining their plant in North Reading and the work of construction will commence shortly.

The deadlock in the Board of County Commissioners over the letting of the contract for the bridge over the Schuylkill at Schuylkill avenue has been ended by awarding the contract to Cofrode & Saylor.

Saratoga, N. Y.—The Saratoga County supervisors have granted a franchise for a free bridge over the Hudson River at Thompson's Mills. The bridge will be erected by the owners of the pulp mills at that point, and will be wide enough for railroad tracks.

Syracuse, N. Y.—The contract for constructing a lift bride over the Oswego canal at Syracuse, was awarded last week. The substructure work was awarded to John J. Hallock, of Syracuse, at $2,077 and the superstructure work to the Groton Bridge & Mfg. Co., of Groton, at $7,539.

Tacoma, Wash.—The city council has passed an ordinance providing for a special election to be held next month for the purpose of voting on the question whether bonds to the amount of $120,750 shall be issued, the proceeds to be used in constructing a bridge from South Eleventh street to the Puyallup tide flats. The bridge is to cost $115,000.

Toledo, O.—The Michigan Central will begin building a street bridge over the Lake Shore tracks near the Air-line Junction in Toledo during December.

West Point, Ky.—The Louisville, St. Louis & Texas has applied to the War Department for permission to bridge Salt River near West Point.

Williamsport, Pa.—The new double-track iron bridge for the Philadelphia & Reading, over the Lycoming Creek, was put into position on Sunday last.

Woodstock, Md.—William H. Shipley, bridge superintendent, has reported the iron bridge at Woodstock to be unsafe, and the Howard county commissioners will meet the Baltimore county commissioners to arrange for its repair.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Albany & Susquehanna, semi-annual, 3½ per cent., payable Jan. 3.

Boston & Albany, quarterly, 2 per cent., payable Dec. 31.

Chicago, & Eastern Illinois, quarterly, 1½ per cent., on the preferred stock, payable Jan. 2.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, payable Jan. 2.

Columbus, Hocking Valley & Toledo, 2¼ per cent. on the preferred stock, payable Jan. 3.

Connecticut River, quarterly, 2 per cent., payable Jan. 2.

Delaware & Hudson Canal, quarterly, 1¾ per cent., payable Dec. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Philadelphia, annual, Wilmington, Del., Dec. 13.

Brooklyn Elevated, annual, Brooklyn, N. Y., Jan. 4.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 4.

Housatonic, annual, Bridgeport, Conn., Dec. 20.

Rome, Watertown & Ogdensburg, annual, New York City, Dec. 28.

Toledo & Ohio Central, special, Toledo, O., Dec. 31.

Walkill Valley, annual, New York City, Dec. 14.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Wednesday of each alternate month commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at 7:30 p. m., at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Institute of Mining Engineers.

The 64th meeting of the American Institute of Mining Engineers will be held at Montreal, Can., beginning on Tuesday, Feb. 21, 1893. More particular announcements will be made later. Communications concerning the sessions and proceedings, and notice of papers offered, should be addressed to R. W. Raymond, Secretary. Correspondence concerning other matters connected with the meeting should be addressed to Mr. B. T. A. Bell, Ottawa, Can., who represents the local committee.

American Railway Master Mechanics' Association.

The committee on "Boiler Attachments" has issued a circular asking information concerning the following points:

First—Give a list of parts attached to your standard locomotive boiler, which, if broken off in case of accident, would leave openings in the boiler.

Second—How could the number of openings in boilers for such attachments be diminished?

Third—In what way could such openings be protected to prevent escape of hot water or steam in case attachments are accidentally broken?

Fourth—What is the best method of connecting check-valves to boilers—flange joints or screwed direct into boiler? Give size of connection that should be used. Have you had any experience with inside check valves, and what is your opinion of their safety and efficiency compared with outside checks?

Fifth—Water Glass and Gauge Cocks.—Do you think it necessary or advisable to use water glasses in addition to gauge cocks? What size connection do you use? Is it advisable to use an automatic valve in water glass cocks to prevent the blow of steam and hot water in case of water glass breaking?

Sixth—Steam Chambers.—Is it your practice to use a steam chamber to connect blower, injector valves, steam heating valves, etc., or is it your practice to connect these attachments separately to boiler? Is any provision made to close the connection between steam chamber and boiler?

The committee would be glad if replies are not confined to the question, but extend to any information bearing on the subject. Would also be pleased to have drawings and blue prints of any devices used on your line.

James Macbeth, A. Dolbeer, W. A. Foster, James M. Boon, M. N. Forney, Committee.

Replies to be addressed to James Macbeth, Herkimer, N. Y., not later than Feb. 1.

American Society of Civil Engineers.

At the meeting held on Nov. 16, 1892, a paper was read by James Owen, M. Am. Soc. C. E., on "The Controverted Questions in Road Construction." The writer mentions municipal or official control as one of the difficulties incident to such work, and also that those who construct roads have little to do with their maintenance. Complaint is made of the dearth of information on the subject, as that to be had in the books is mostly compiled from foreign sources, and takes little account of local and climatic conditions. Highways were classified as those of earth simply, those made of material delivered and spread in its natural condition, and those made of material artificially prepared. Passing to the second of these the writer mentions gravel roads, depending for their quality on the gravel employed. Good gravel roads give satisfactory results for light traffic for ten months of the year, but are dusty in dry weather and liable to be broken up by frost. As the most thickly settled portion of the country is largely destitute of good gravel, the third class of roads is the most important. The cases to be considered are: first, those where there is an abundance of stone which is not especially adapted to such use; second, where stone is to be had of the best quality for road-making; and third, where there is no stone to be had.

Grades should be fixed by the locality and the money to be spent. An ideal would be 1 per cent.; less than 6 in. per 100 ft. does not give good drainage, and more than 4 per cent. procludes rapid driving; 10 per cent. may be permissible in a mountainous country. Crowning is required to carry water to the gutters; on a 16-ft. road 4 in. is desirable, and to get this 1½ to 2 in. extra should be allowed in construction. The crowning should be increased at least 1 in. on a grade of over five per cent. Allusion is next made to the palpable effects of inattention to drainage, as shown by the damage sure to be caused by frost. In this connection the writer condemns macadam roads as greatly inferior to Telford.

The quality of rock may be greatly inferior for the foundation course, and for this the rock of the region may therefore be used. For the wearing surface the igneous rocks are best. It would be more economical to haul trap rock 300 miles by rail than to use granite found at the site; and to haul granite 200 miles rather than to use limestone. Close-grained basaltic trap is better than coarse grained trap, and granite without mica is better than that with mica. Limestone is infinitely better than mud.

One of the questions upon which there has been much controversy is the thickness of artificial road coverings. The writer's experience has been distinctly in favor of thick roads with a foundation course of stone, or the Telford as opposed to the macadam system. With the severe frosts to which our roads are exposed, foreign experience is not to be relied upon. In sandy or gravelly districts thin macadam roads may prove successful; also in regions where the frost never penetrates more than 8 ins., provided there is good drainage; also in mountainous regions with heavy grades. A foundation is, however, a necessity in all alluvial regions. The writer now adopts a total thickness of 8 ins. for ordinary country roads with good results, and no breaking up by frost has ever occurred. The foundation is closely and carefully laid, well wedged so as to immediately distribute any load coming upon it. Such foundations serve as drains, and the writer has found this so effective that he now makes the thickness of roadbed depend upon the grade, using 10 in. for grades of less than 1 per cent.; 8 in. for grades of from 1 to 5 per cent., and 6 in. for grades of over 5 per cent. These roads have been eminently successful as to smoothness and durability. On the contrary, some 4-in. roads on a muddy bottom, necessarily laid without a foundation course, failed badly after two years' use; on gravelly soil, however, in an adjoining county, such roads did well for three years, when a severe spell of frost played havoc with them, making them even worse in some places than the original mud. The question of soil comes in to modify all conclusions, and a thin road as an educator and a means of relieving quickly a large area of country may be properly considered, no regard being had to subsequent cost for repairs.

The writer takes up the question of packing a roadbed, and demurs to the practice of rolling the bed for a Telford foundation, preferring to scoop out for inequalities in the size of stones, and not to compress the soil, and prevent stones coming to a bearing. On the foundation course the writer places a coating of loam or clay, ¼ to ⅝ in. thick, and then rolls to a uniform surface. On this the broken stone is spread to the required thickness, and consolidated by rolling. On this is spread another thin coat of packing, and all compacted together by rolling, and travel over the road is then invited. The use of packing has been stoutly contested, but in the writer's experience is a saving in cost of rolling and in subsequent repairs. The rolling of roads has been a matter of much controversy. The use of a roller can never, in the writer's opinion, make a road, but it is an adjunct to the wheel travel, enabling the latter to do its work. The only advantage in the use of a steam roller is that it is cheaper than horse-power. The application of 2 tons 100 times is believed to be more efficacious than to apply 20 tons 10 times. In the repair of roads, if a steam roller be used it will be in practically continuous use, and will put an embargo on travel for the time being wherever it may be. The last question discussed is the use of screenings as a surface for roads. The writer does not consider their use economical. A coat ½ in. thick will last from three weeks to a month under heavy travel, and is an expensive luxury. The writer has known a 4-in. road to require repairs in a year, and a 12-in road to be in fair order after nineteen years with no repairs. The average duration of a road is five years, but a fair estimate for repairs is 3 in. of new stone every four years.

At the meeting of Dec. 7, a paper on "The Use of Asphaltum for Reservoir Linings," by James D. Schuyler, M. Am. Soc. C. E., was read. The paper mentions that experiments in this use have been made in various parts of California, where asphalt is found in a great variety of forms. It seems to be especially adapted for reservoir lining, as it is elastic and does not crack, is insoluble in water or acids, imparts no taste to the water, and is easily kept in repair. The experiments made have been generally successful. At San Buena Ventura a circular reservoir 100 ft. in diameter and 10 ft. deep, part in excavation in a light sandy and gravelly soil and part in embankment, from the material excavated with slopes of 1 to 1, was paved on bottom and sides with cobble stones laid in mud. Over this a sheet of hot liquid asphalt from $\frac{1}{16}$ to $\frac{1}{4}$ in. thick was spread with brooms. After filling with water, one part of the bank settled 2 ft., but it caused no leak. A small reservoir excavated in shale and soft sandstone was similarly coated, and has now done good service for a year. The writer built a circular reservoir 64 ft. in diameter, 7 ft. deep, with slopes 1 to 1, lined with asphalt ½ in. thick. The first coat was laid in vertical sections 2 ft. wide, and was a mixture of 15 per cent. of asphalt and 85 per cent. of beach sand heated to 300 per cent., spread with rakes, and tamped with hot irons. The neglect to paint the raw edge of previously laid sections before applying additional ones caused vertical cracks to appear after about a year's use. The repair of these required three days' labor of one man and ⅛ barrel of asphalt, and no cracks have since appeared. Strips of strap iron were driven into the slope at frequent intervals, to attach the asphalt to the slope, and a second coat, about ⅛ in. thick, of asphalt fluxed with 10 per cent. of "mineral tar," heated to a temperature of about 250 deg. Fahr., was applied to the entire surface, and smoothed with hot irons.

This experience led the writer to recommend the use of asphalt in lining two large distributing reservoirs at Denver. The dimensions of these are 350×420 ft. and 236×580 ft., with depth to flow line, 26 ft. The inner slopes are 1½ to 1. They lie on sloping ground, and were excavated to full depth of 32 ft. on the upper side, and embanked on the lower. They were mostly excavated in the winter; and a 12-ton steam roller was used to consolidate the banks, the material being sandy loam, clay and shale. A 5-ton slope roller was used on the slopes. For one of the reservoirs, Trinidad asphalt was then applied in a mixture consisting of 20 per cent. asphalt mastic and 80 per cent. sand. This was hauled 2½ miles in wagons; and if the temperature was below 250 deg. Fahr. on arrival, it was rejected. It was laid in horizontal strips, 10 ft. wide and 1¼ in. thick, with hot rakes, tampers, etc.; and, while still hot, anchor spikes 1 x ⅛ in., 7 to 8 ins. long, were driven 12 in. apart each way, alternate rows being temporarily left projecting above the surface to support strips on which the workman could ascend and descend the slope. A finishing coat was put on (the spikes being first driven flush), and finished by smoothing irons heated to a cherry red, leaving a bright glossy surface. The cost per square foot was $14\frac{25}{100}$ cents.

The La Patera asphalt, which was used for the other reservoir is a rock asphalt from Southern California. The mine is but 100 yds. from the ocean, and the workings now reach 70 ft. below tide level. The material is brittle, not sticky, mines easily, does not melt in the sun, contains about 60 per cent. of bitumen of which 9 per cent. is volatile, and costs at the mine $20 per ton. The Las Conchas asphalt used as a fluxing material is from a deposit 30 miles east of the La Patera mine, is richer in oils, and contains about 13 per cent. of "fixed" bitumen, and 86 per cent. which is volatile at 1,100 deg. After extracting the asphalt from the sand in which it is found, it is a viscous mass at ordinary temperature and is shipped in barrels. The writer then describes the method of preparing the mastic for coating the reservoir, 78 per cent. of the La Patera asphalt to 22 per cent. of the Las Conchas flux being boiled together at a temperature of 250 deg. to 300 deg; 20 percent. by weight of this mastic to 80 per cent. of sand was used in the first coat. These were, after mixing, spread with hot rakes and compressed with rollers made from sections of cast-iron pipe in which a hanging fire-basket maintained the heat. A ⅝-in. wire rope pulled the roller and it was manipulated by about seven men. This method was more satisfactory than tamping. The cost for this reservoir was $13\frac{45}{100}$ cents per square foot.

As proofs of the utility of this use of asphalt, the writer states that in one of the made banks of the reservoirs just described, a fissure 6 in wide and 100 ft. long was repaired at a cost of $20, without drawing the water off. During last winter ice formed 18 in. thick, when the water stood within 8 ft. of the top, and while it was frozen fast to the lining all around the water was lowered 4 ft. without injury to the lining.

Mr. Schuyler's paper was discussed at some length by Messrs. Brush, Whinery, Flagg, Parsons, Crowell, O'Rourke and others. They had had no experience with such uses of asphalt, but thought the paper very useful as showing the importance of further trials of it in similar applications. It is quite possible that climatic differences would cause different results from those got by Mr. Schuyler. The engineer who tries asphalt should remember, too, that it a delicate material to handle. An error of one per cent. in the mixture may make the difference between success and failure. Moreover, bitumen mixed with sand is permeable to water and liable to soften and disintegrate. This quality would make one suspicious of it for a reservoir lining. Mr. Whinery had found it as prepared for pavements very malleable, with a coefficient of expansion about the same as wrought iron. He thought Mr. Schuyler's figures of cost ample. The asphalts of California are extremely variable in quality and must be handled with caution.

The following elected to the Society:

Members.—William Henry Brown, Chief Engineer Pennsylvania R. R.; also Chief Engineer of the following roads: Philadelphia, Wilmington & Baltimore, Northern Central, Baltimore & Potomac, West Jersey and Camden & Atlantic; Philadelphia, Pa.; Howard Constable, New York City. Edmund Gybbon Spilsbury, Managing Director of the Trenton Iron Co., Trenton, N. J.

Associate Members.—Henry Furlong Baldwin, Chief Engineer Chicago & Illinois R. R., Chicago, Ill.; Edward Thomas McConnell, Engineer Maintenance of Way in charge of Maintenance of Way and new work Peoria and Eastern R. R., Indianapolis, Ind.

Boston Society of Civil Engineers.

At the next meeting, to be held Dec. 21, Prof. A. E. Burton, of the Massachusetts Institute of Technology, will read a paper entitled "Base Line Measurements with the Steel Tape."

A reading-room for members of the Society has been fitted up at 36 Bromfield street, Boston, Mass.

The Southern and Southwestern Railway Club.

The next meeting of the Southern and Southwestern Railway Club will take place at the Kimball House, Atlanta, Ga., on Thursday, Jan. 19, 1893, at 10 o'clock a.m. The subjects for discussion will be: 1. "The Best Course to Pursue to Reduce Oil Consumption in Engines and Cars," with Messrs. T. W. Gentry, A. T. Hooker and James Cullen as special committee. 2. "Driving Boxes—Best Material and Shape, in Order to Prevent Breakage and Wear. Is the Solid Box Suitable for Heavy Engines," with Messrs. A. W. Gibbs, Jas Meehan and F. E. C. Davis as special committee. 3. "Staybolt Inspection," with Messrs. R. P. C. Sanderson, W. H. Owens and F. H. McGee as special committee. 4. "The Best Material for Piston Rods and Mode of Fastening Rod to Crosshead and Piston-Head," with Messrs. G. W. O'Brien, Geo. D. Harris and Wm. Rutherford as special committee. 5. "The Experience of Members on Compound Engines." The following committe is expected to make a report: Messrs. W. H. Thomas and Pulaski Leeds on "Repair Work on Large Systems and Location of Plants for Same." S. A. Charpiot, Macon, Ga., is Secretary.

The Steel Works' Club at Joliet.

The third annual meeting of this club was the occasion of a very pleasant reunion at Joliet last Saturday. A special train from Chicago carried representative officers of the Illinois Steel Co., and about seventy guests on the invitation of Mr. W. R. Stirling, First Vice-President of the company. A luncheon was served on the train on the way out, and on reaching Joliet at about 2:30 p. m., the visitors from Chicago were met by a large local representation and an interesting meeting was held in the audience room of the club house. Addresses were made by Mr. F. A. Emerton, Chairman of the Board of Directors of the club, by Mr. W. R. Stirling, the Rev. J. G. K. McClure, of Lake Forest, President Harper, of the University of Chicago, and others. In the course of his report, Mr. W. Crane, superintendent of the club, said that there are now about 900 members in good standing. During the year 77,943 members have visited the club house, the total attendance for three years having been 237,335. The library now contains over 5,500 volumes, and the circulation of the present year has been substantially the same as that of last year. During the three years of the club's history 28,998 books have been given out for home reading. The kindergarten has now an enrollment of 56, and is in its way one of the most appreciated departments of the club. The classes in arithmetic, short-hand, penmanship and book-keeping all show an

increased number of students, while for the class in mechanical drawing there have been many more entries than in any previous year. In all, 639 persons have received instruction in the club classes during the last three years. A new field has been opened this year by establishing a centre for extension lectures in connection with the University of Chicago. A large number of lectures, concerts, and other entertainments, have been given by the club since its organization. During the last four months a system of co-operation in the purchase of articles of general consumption has been put in practice, and during that time goods to the value of $5,000 have been purchased, on which the net saving has exceeded $1,200. The committee on benevolent action has not had many claims presented to it the past year, having disbursed only a little over $100.

Further particulars in regard to the organization and arrangements of the club will be found in the *Railroad Gazette* Dec. 11, 1891.

PERSONAL.

—Mr. Adrian Iselin, Jr., of New York, has been recently elected Vice-President of the Buffalo, Rochester & Pittsburgh.

—Mr. W. J. Lawrence, Division Superintendent of the Colorado Midland, with headquarters at Colorado City, has resigned.

—Mr. W. S. Wing, Auditor of Passenger Accounts of the Union Pacific, has resigned, and, it is reported, will be succeeded by C. S. Stebbins.

—Mr. Thomas Nolan, of the firm of Nolan Brothers, well known bridge and railroad contractors, died at Reading, Pa., last week, aged 50 years.

—Col. W. W. Gordon, one of the most prominent railroad lawyers in the South, and formerly associated with the Richmond & West Point Terminal Co., died at Richmond, Va., this week.

—A lecture on Passenger Traffic in large cities was delivered before the students of the Rensselaer Polytechnic Institute at Troy, N. Y., on Nov. 30, by Mr. J. J. R. Croes, M. Am. Soc. C. E. of New York City.

—Mr. F. W. Sargent, formerly engineer of tests on the Chicago, Burlington and Quincy, and recently general agent for the Congdon Brake Shoe Co., is now superintendent of the latter company's Brake Shoe and Iron Department.

—Mr. John Whitmore, Traffic Manager of the Fitchburg is reported insane and he has been sent to the McLean Asylum. Mr. Whitmore's insanity is not of a violent type, and his friends have hopes that he will recover. He has been Traffic Manager of the Fitchburg since 1882.

—Mr. Harry C. Wilson, Private Secretary to General Manager Mellen of the Northern Pacific, died in St. Paul Dec. 1, after several weeks' illness, of typhoid fever. Mr. Wilson was only 25 years of age and had occupied responsible positions with the St. Paul & Duluth and the Northern Pacific.

—Mr. Charles Dillingham, Receiver and General Manager of the Houston & Texas Central, has tendered his resignation, which has been accepted by the United States Court at Galveston, to take effect Dec. 30, when the control of the road will probably be transferred to to the purchasers at foreclosure sale.

—Mr. J. E. Matthews, Engineer and Roadmaster of the Western Maryland for 17 years, died of consumption, at Baltimore, last week, aged about 50 years. He had been unable to attend to the active duties of his position since July 1891. One of his last works was the survey of the Potomac Valley extension of the road.

—A number of changes have recently been made in the organization of the West Milwaukee shops of the Chicago, Milwaukee & St. Paul. Mr. Elijah Fairbairn, Master Mechanic of the shops has resigned and has been offered another position. Amos E. Allcott, General Foreman, Joseph Corner, Foreman of the Erecting Shops and other foremen have resigned. Mr. C. A. Place, who has been Paymaster since 1861 will retire on Jan. 1 with a pension.

—Mr. A. M. Cooke, Assistant General Manager of the Yazoo & Mississippi Valley road, formerly the Louisville, New Orleans & Texas, has resigned and the office will probably be abolished. Mr. Cook was for a number of years connected with the Atlanta, Mississippi & Ohio road, in the freight department, and in 1885 he accepted a position with the Louisville, New Orleans & Texas as purchasing agent. He was made assistant to the General Manager and three years ago became Assistant General Manager.

—Mr. D. D. Sewall, formerly General Manager of the Consolidated Car Heating Co. has been elected Vice-President of that company. Mr. J. F. McElroy, formerly Mechanical Superintendent has been appointed Consulting Engineer and Mr. J. H. Sewall, formerly Assistant General Manager, with headquarters at Chicago, has been appointed Superintendent of Construction with headquarters at Albany. The offices of General Manager, Assistant General Manager and Mechanical Superintendent of the Consolidated Car-Heating Co. have been abolished.

—Mr. C. S. Sergeant recently appointed General Manager of the West End Street Railway Co., of Boston, which controls nearly all the street railroads in that city has been Acting General Manager for several months, and is now about 40 years old. He has been connected with railroading for a number of years, and has held several positions on western railroads. In 1876 he was appointed Auditor of the Eastern Railroad soon after its consolidation with the Boston & Maine. Later he became connected with the Kansas City, Ft. Scott & Memphis and in 1887 was appointed Auditor of the West End Street Railway, and last January he became Second Vice-President. His salary is reported to be $8,000.

—Dr. Werner Siemens died in Berlin Dec. 2. He was one of the great scientific men of the century—a student, philosopher and a man of great practical achievement. He made many important discoveries in electricity, and in physics; and as founder and head of the famous house of Siemens & Halske, he was a pioneer in the modern art of electrical engineering. His firm built telegraph lines and laid cables in many quarters of the globe, and turned out electrical engineers who have carried the knowledge of the art everywhere. The same firm took up the application of electricity to railroad signaling, and developed it to a very high point on the continent of Europe. The firm also went early into the manufacture of electrical machinery for stationery plants and for electric railroads, and built up an immense business. Branches of the house have been established in London and St. Petersburg, and at this moment a plant is building at Chicago for an American branch of the same concern. The American house of Siemens & Halske will doubtless be a formidable competitor for business in this country, but, as we understand, its business for the present will be confined to lighting and stationary power plants; although we can hardly imagine that the field of electric railroads will long be neglected and it would seem inevitable that railroad signaling should very shortly be added to the business of the house.

Dr. Siemens was born in Lenthe, Hanover, in 1816, and entered the Prussian service, in the artillery, in 1834. He left the service in 1850. In the intervening years he had greatly distinguished himself by numerous practical applications of electricity. As a scientist, his name has become well known throughout the whole civilized world, and he was a member of many learned societies. He wrote frequently for these societies and for scientific journals, and it is but a few years ago that he startled the world by advancing the theory that mankind would eventually make food out of the elements, and become comparatively independent of the sources on which mankind now relies.

ELECTIONS AND APPOINTMENTS.

Alabama Midland.—At a meeting of the stockholders at Montgomery this week, the following directors were elected: H. B. Plant, M. F. Plant, H. S. Haines, H. M. Flagler, M. J. O'Brien, W. F. Vandiver, O. C. Wiley, Henry Sanford, M. Carroll. The directors elected H. B. Plant, President; M. F. Plant, Vice-President; R. B. Smith, Secretary and Treasurer; and Bradford Dunham, General Superintendent.

Boston & Maine.—Armand Lalonde has been appointed Canadian Passenger and Freight Agent, vice N. L. Hobart, Canadian Freight Agent, resigned and James Dunn, Canadian Passenger Agent, resigned. His headquarters will be in Montreal.

Chicago & Eastern Illinois.—Robert Spencer, previously Acting Purchasing Agent of this company, has been appointed Purchasing Agent, with office at Chicago.

Chicago, Rock Island & Pacific.—J. C. McCabe, Second Assistant General Freight Agent of the Rock Island, has been appointed General Freight Agent of the Chicago, Rock Island & Texas, which is a part of the same system. E. B. Boyd has been promoted from the position of Chief Rate Clerk to succeed Mr. McCabe.

Chicago & West Michigan.—P. Conley, Assistant Superintendent has resigned and has been succeeded by F. M. Drake. Mr. Drake's place as Assistant Superintendent of the Detroit, Lansing & Northern has been taken by T. H. Malone, formerly Chief Train Despatcher. W. E. Wolfenden has been appointed General Baggage Agent of both lines.

Georgia Midland & Gulf.—At a recent meeting in Columbus, Ga., the old board of directors was re-elected as follows: James E. Granniss and E. R. Lancashire, New York; C. L. Davis, Warm Springs; Seaton Grantland, Griffin, Ga.; J. W. Alexander, McDonough, and T. M. Foley, T. J. Pearce, J. F. Flournoy and A. Illges, of Columbus. The officers re-elected are: James E. Granniss, President; John F. Flournoy, Vice President; G. Gunby Jordan, General Manager; T. C. S. Howard, Secretary and Treasurer.

Hartwell.—E. B. Benson has been appointed Receiver of this road, which is a branch of the Richmond & Danville in Georgia.

Indiana & Illinois Southern.—H. H. Gardner has been appointed Secretary of this company, with headquarters at Chicago. J. L. Stockton has been appointed Treasurer, with office at Chicago, vice M. B. Wilson, resigned.

Kansas City, Nevada & Fort Smith.—F. M. Hill, General Superintendent of this road, having resigned, all matters relating to that department will be referred, until further notice, to Richard Gentry, General Manager, at Kansas City.

Kentucky Union.—Russell Armstrong having resigned his position as Auditor of this company, George Copland, Comptroller, in addition to his present duties, has assumed full charge of the auditing department. His headquarters are at Clay City, Ky.

Lehigh & Hudson River.—The stockholders of the company, at the annual meeting Dec. 5, elected the following board of directors: Grinnell Burt, Joseph S. Harris, E. W. Clark, Edward Lewis, John S. Martin, George W. Sandford, J. R. Maxwell, Henry Graves, G. F. Baker, G. A. Hobart, E. D. Adams, W. R. Potts and Charles Caldwell.

Louisville & Nashville.—G. A. Park is Assistant General Passenger Agent of the Owensboro & Nashville Division, with headquarters at Owensboro, Ky.

Michoacan & Pacific.—A. Attwood has been appointed General Manager of this company, Vice W. W. Williams. His office is at Maravatio, Mex.

Middletown & Cincinnati.—The present officers of this company are as follows: Paul J. Serg, President; T. C. Simpson, Middleton, O., General Manager; Thomas Hetzler, Traffic Manager; C. C. Spalding, General Freight Agent.

Middletown & Crawford.—At the annual meeting of the company this week, the directors were re-elected as follows: John King, Albert Bull, P. M. Crosby, W. L. Strong, E. B. Thomas, Andrew Donaldson and A. R. McDonough.

Mount Vernon, Bayview & Northern.—The incorporators are. H. P. Downs, Harrison Clothier, G. E. Brand, of Fairhaven, Wash.; J. B. Moody, G. E. Hartson, J. F. St. John, Atto Klement, F. E. Pape and W. J. McKenna, of Bayview, Wash.

New York, Lake Erie & Western.—The vacancy created by the promotion of August Mordecai, formerly General Roadmaster of the Nypano and Chicago & Erie, to be Chief Engineer of the Erie, has been filled by the appointment of J. W. Morris, heretofore Division Engineer of the Third and Fourth Divisions, as Acting General Roadmaster of the roads mentioned above.

Northern Steamship Co.—General Manager John Gordon announces the appointment of T. P. Carpenter as General Passenger Agent of the company, with office at 56 Main street, Buffalo, N. Y. Mr. Carpenter was formerly General Passenger Agent of the Lake Superior Transit Co.

Ohio & Mississippi.—L. C. Fritch has been appointed Engineer Maintenance of Way, with office at Cincinnati, O. C. M. Stanton has been appointed Division Superintendent, with headquarters at Springfield, Ill.

Pennsylvania.—E. I. Roller has been appointed South American Passenger Agent, with office at No. 27 Rua do Hospicio, Rio de Janeiro, Brazil.

Philadelphia & Reading.—M. F. Bonzano, General Superintendent, has transferred his headquarters from the general office of the company, 227 South Fourth street, Philadelphia, to the city of Reading, Pa., with the entire force of his office.

Pittsburgh, Akron & Western.—George F. Gardner has been appointed Master of Transportation of this company, with office at Akron, O.

Providence & Springfield.—The stockholders elected the following directors at Providence, R. I., Dec. 7: William Tinkham, William Pope, Fenner H. Peckham, jr., Benjamin Vaughn and Charles L. Vaughn, Providence; Albert L. Sayles, Pascoag, R. I.; Peter B. Wickoff, New York; F. H. Prince, C. A. Prince, Boston. The directors elected B. F. Vaughn, President; William Tinkham, Chairman, and William H. Pope, Secretary and Treasurer.

Richmond & Danville.—At a meeting of the stockholders held at Richmond, Va., Dec. 7, the following officers were elected: President, Walter G. Oakman; Board of Directors, W. P. Clyde, George J. Gould, R. S. Hayes, E. P. Howell, J. C. Mayben, John Y. Moore, James B. Pace, John A. Rutherford, Thomas E. Ryan, Geo. E. Stone, William E. Strong, Samuel Thomas. All members of this Board are of New York, save Messrs. Howell, of Atlanta, and Pace, of Virginia.

St. Louis Southwestern.—J. H. White, Assistant Superintendent, in charge of the Fort Worth and Sherman branches, has had jurisdiction extended to cover the main line from Texarkana to Fort Worth, with headquarters at Commerce, Texas. J. L. Teague, formerly Assistant Superintendent of the Lufkin branch, has been made Chief Dispatcher, with headquarters at Tyler, Tex.

Safety Car Heating & Lighting Co.—George M. Terry, formerly private secretary to President A. W. Soper, has been appointed agent for the company at Chicago, with office 1,022 Rookery Building.

Sandy River.—The annual meeting was held at Phillips, Me., last week. The recent change in ownership of the stock resulted in the election of a new board of directors as follows: President, Weston Lewis, Gardiner, Me.; Vice-President, J. S. Maxcy, Gardiner; Clerk and Treasurer, George A. Farrington, Gardiner; Superintendent, F. N. Beal, Phillips, Me.

Santa Fe, Prescott & Phœnix.—At the annual meeting of the stockholders the following directors were elected: G. W. Kretzinger, N. K. Fairbank, E. M. Dickey, D. W. Robinson, Chicago; D. M. Ferry, Detroit; W. A. Bissell, San Francisco; F. M. Murphy, G. W. Vaughn, W. B. Batsford, Prescott, Ariz. The following officers were elected: D. B. Robinson, President; C. W. Vaughn, Vice-President and Chief Engineer; F. M. Murphy, Secretary; E. M. Dickey, Treasurer; G. W. Kretzinger, General Counsel.

South Bound.—I. M. Fleming has been appointed General Freight and Passenger Agent of this company, Vice D. S. Cowan, Jr., resigned, with office at Savannah, Ga.

Ulster & Delaware.—The annual meeting of the stockholders and income bondholders was held Dec. 6. The following directors were elected: Edwin Young, Horace C. Young, Robert C. Pruyn, Joseph Cornell, W. A. Read, J. D. Layng, C. C. Clark, A. Van Santvoord, Davis Winnie, A. S. Staples, H. C. Soop, J. H. Tremper and Samuel G. Dimick.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Abingdon Coal & Iron.—W. P. Fortune & Son, Abingdon, Va., who are the contractors for this road, are still at work on the grading between Abingdon and Damascus, Va., which was begun during the summer. This section is 15 miles long and will probably be graded by Jan. 1. No track will be laid until 1893. The survey has been made for a line from Damascus to Mountain City, Tenn., about 16 miles, and this line may be built when the contractors are through with the work on the present section. J. C. Watson, Jr., of Abingdon, Va., is Chief Engineer

Akron & New Castle.—A charter for a company of this name was filed at Columbus, O., last week. The capital stock is $350,000. No other details are given. The new company may be a reorganization of the Akron & Eastern, which was chartered in 1891 to build an extension of the Pittsburgh, Akron & Western from Akron, O., east to New Castle, Pa.

Alabama & Gulf.—A bill has been introduced in the Alabama Legislature incorporating the road, with J. E. Dennis, E. A. Graham and H. G. McCall, of Montgomery, as incorporators. The road is projected to extend from Montgomery in a southerly to the Alabama-Florida State line in Geneva or Covington county. The capital stock is $100,000.

Buffalo & Susquehanna.—About 600 men are still at work on the construction of this road to Galeton, Pa., which is practically an extension of the Sinnemahoning Valley Road. It is being built, however, under distinct charters, those of the Buffalo & Susquehanna and the Susquehanna roads. The line is about 34 miles long extending eastward through Potter County from Costello to Galeton. The line has been graded excepting four miles and over two thirds of the track has been laid. All the bridges are of wood the longest span being 100 ft. The maximum grade is 132 ft. to the mile and the maximum curvature 16 deg. F. H. Goodyear, of Buffalo is President of all the roads mentioned, and C. E. Botsford is Chief Engineer of the Susquehanna and Henry Herden is Chief Engineer of the Buffalo & Susquehanna.

Canadian Pacific.—A survey is reported to have been recently made for a branch four or five miles long from Brownville Junction, Me., west to the quarries of the Merrill Slate Co.

Chicago, Rock Island & Pacific.—A newspaper report that contracts were let for the extension south of Bowie, Tex., are denied, but one of the officers writes us that the contract for grading part of the line south of that point toward Fort Worth will be awarded very soon.

Chicago, St. Paul, Minneapolis & Omaha.—The branch from Ponca to New Castle, Neb., which has been graded for some time, will be ironed next year. The completion of this branch will add about 10 miles to the Ponca branch, which is now operated for 28 miles from Sioux City.

Clearfield & Mahoning.—J. M. Floesch, Chief Engineer, reports the work on the line as progressing rapidly, and trains will be running over it by May, 1893. The heaviest work remaining to be done is near Bridgeport, Pa., where a high bridge and iron trestle must be built, and on the Dubois end of what is known as "the Shields contract," where heavy work remains to be done in a cut. The road is being built from Dubois, Pa., to a connection with the Beech Creek, 27 miles, and the track will be laid when the work on the cut is completed.

Everett & Monte Cristo.—Bridge building on the road near Hartford, Wash., which was suspended on account of the recent flood in Washington, has been resumed and track laying will be pushed as fast as the bridges are completed. It is believed that no work will be attempted near the divide until after the snow has melted owing to the cost and difficulty in getting in supplies. The wagon road and bridges will be repaired in the meantime.

Exeter.—It is thought that this short line will probably be under contract before Jan. 1 next. The line is to be less than five miles long, and will connect with the Concord & Montreal and may be built by that company. It is to extend from Exeter to East Epping, N. H. John J. Bell, Exeter, N. H., is President.

Florida Central & Peninsula.—The contract was let in New York this week for the proposed extension to Savannah, Ga., to connect the road with the South Bound line, which was leased by the company some months ago. The Southern Supply Co., of Atlanta, Ga., has the contract. G. W. Bentley, formerly connected with the Jacksonville, Tampa & Key West, and lately with the Charleston, Cincinnati & Chicago, in New York City, is reported to be General Manager of the construction company. The new line is to be about 114 miles long, and will begin at Hart's Road, Fla., a station some miles north of Jacksonville, and cross the Brunswick & Western near Brunswick, G., connecting with the South Bound at Savannah. The surveys were made during the summer and fall, and the route adopted is said to be on an average about 15 miles from the seashore. The construction work will be completed next fall.

Geneva & Van Ettenville.—The through trains between Buffalo and Philadelphia over the Philadelphia & Reading and Lehigh Valley are now running over this road between Van Etten and Geneva, N. Y., the first train having been run Dec. 4. Heretofore the through trains have run over the Ithaca branch of the Lehigh Valley. The line has now been double tracked the entire distance between Van Etten and Geneva, 57 miles, excepting for about three miles near Geneva, which may not be completed for two months on account of the long trestle at that point.

Great Northern.—Col. W. P. Clough, Vice-President of this road, had just returned to St. Paul from a trip to the Pacific Coast and said in regard to the completion of the extension: "The unprecedented high water seriously interfered with track laying. It ruined the roadbed in many places; and, while, previous to the floods, track laying was progressing on both sides of the Cascades, it is now being carried on entirely from the Eastern end. It is a matter of conjecture as to the exact time of the completion of the line, but I should place the time about Jan. 1. That would allow for unforeseen delays. The contract for the tunnel through the Cascades has not been let. This tunnel will be the second longest in this country, the exact length will be 13,128 ft." Despatches from the West state that in order to lay track two feet of snow must first be shoveled off the roadbed, then the ties and rails are laid.

The line to Red Lake Falls, Minn., was completed on Dec. 1, and is now open for business. Engineers are now in the field completing the preliminary survey for the line from the Red River Valley to the head of Lake Superior. The survey from the Fosston line to Milaca was made in 1888, and it is possible that a part of this may be followed in the new survey. Last fall the survey was completed from Park Rapids to Leech Lake, and it is probable that the line will be built next season as well as the one now under survey.

Hancock & State Line.—Nathan Bundy, of Philadelphia, is President and B. S. Dougherty, O. L. Perry, M. W. Collet, Philadelphia; J. A. White, Charles P. Knapp, Deposit, N. Y., directors of this company which was chartered at Harrisburg, Pa., Dec. 2, with a capital stock of $60,000. The line will be six miles in length and extend from a point on the Pennsylvania bank on the Delaware River nearly opposite the village of Hancock, N. Y., to the intersection of the State line of New York and Pennsylvania at the Delaware River.

Hot Springs & Mountain Valley.—The survey is now being made for the line between Hot Springs and Mountain Valley, Ark., and the contracts for the 12 miles will be let when the surveys have been completed. The line is to be in operation by next March. Z. W. Ward, Jr., of Little Rock, Ark., is General Manager.

Indianapolis, Logansport & Chicago.—The contracts for constructing the line are now under consideration by the directors, and it is expected that arrangements will be made to begin work this year. It is proposed to build the line between Indianapolis and Logansport, Ind., about 70 miles, before next June. The right of way for the line has been secured excepting a short distance in the city of Indianapolis. Walter A. Osmer, of Logansport, is Chief Engineer.

Indianapolis & Southwestern.—Articles of incorporation have been filed with the Secretary of State in Illinois. The company proposes to construct a railroad from Indianapolis, Ind., to East St. Louis, Ill. The capital stock is $250,000, and the incorporators are J. G. Davis, W. A. Wallace, George H. Crosby and William A. Ball, of Chicago; L. W. Downey, Gosport, Ind.; J. M. Jones, Cataract Falls, Ind.

Kanawha & Buckhannon River.—This road, which, as noted last week, has secured a charter in West Virginia, will be built by the Kanawha & Buckhannon River Lumber Co. for log and lumber purposes exclusively. It is at present only surveyed for some three miles, and will form a junction with the railroad built by the Buckhannon River Lumber Co., whose tracks will be used for about two and one-half miles to the West Virginia & Pittsburgh Railroad. W. D. Jenkins, Neal Building, Baltimore, is at the head of the company and R. E. McQuay, Buckhannon, W. Va., is engineer.

Lake Hopatcong, Boonton, Morristown & New York.—The building of this road now depends entirely, it is reported, on the success in securing the right of way, part of which has already been obtained. The length of line which it is proposed to build is 21 miles, the main line being from Caldwell to Rockaway, N. J., 15 miles, with branches to Boonton and Morristown, N. J. C. C. Vermeule, of 71 Broadway, New York, is Chief Engineer, and H. C. Raynolds, of Whippany, N. J., is Secretary.

Engineer Vermeule is making a new survey of the line between Rockaway, on the Central of New Jersey, and Parsippany, Morris county, N. J. The new line will extend close to the Morris canal, and after crossing the Delaware, Lackawanna & Western at Ketcham's will pass through Fox Hill to Parsippany. Most of the right of way has been secured from Caldwell to Parsippany.

Lancaster, Oxford & Southern.—The grading is now well under way and the work is progressing satisfactorily. The new road will run from Singerly, Md., in a direct line through Elk and East Nottingham townships to Oxford, Pa. Here the Peach Bottom road, which is under the control of the new management, will be changed to standard gauge as far as King's Bridge, Lancaster County. From King's Bridge a road will be built from Quarryville to Lancaster, Pa. By means of this line the Baltimore & Ohio will be able to reach the coal fields over a branch of the Philadelphia & Reading, connecting at this point.

Louisville & Nashville.—Work was begun this week on the new branch from Bragg's Tank, near Longview, Ala., to Lewis post office, in Shelby county. The branch will be about 15 miles in length, and will reach a rich timber and ore region. The DeBardeleben Coal & Iron Co. owns a great deal of the land through which it passes.

Midland Terminal.—H. Ridgeway, formerly Division Superintendent of the Denver & Rio Grande is at Cripple Creek, Col., making arrangements for the tracklaying on the Colorado Midland branch to the Cripple Creek mines. The track is now being laid from the connection with the Colorado Midland at Hayden Divide, Col., north.

Milwaukee & Grand Rapids.—The company has begun active work in Michigan, and has a road now under construction from Belding, Mich., West to Grand Haven via Grand Rapids. The right of way has been secured; the roadbed partly graded, and ties have been delivered. The grade is 12 ft. to the mile. Arrangements have been made for terminal facilities at the Union Station in Grand Rapids. At Grand Haven the company has 1½ miles of dockage and also other land.

Milwaukee & Northern.—The 50 mile branch which has been building during the summer in the northern peninsula of Michigan is now about completed, and the entire line will probably be in operation by Dec. 17. The line under construction extends from Channing, a station near Sagola, Mich., via Amasa to Sidnaw a distance of 47 miles. McIntosh Brothers of Milwaukee are the contractors.

Montgomery & Southeastern.—A bill has been introduced in the Alabama legislature, incorporating the road, with B. H. Walker, E. A. Graham and H. G. McCall, of Montgomery, as incorporators. The road is projected from Montgomery to a point on the Georgia-Alabama State line in Henry county. The capital stock is $100,000.

Mount Vernon, Bayview & Northern.—This company has been organized at Mount Vernon, Wash., to build a road from Mount Vernon to Edison, on the Samish river, a distance of 15 miles. Articles of incorporation will soon be filed. The road will pass the towns of Avon, Fredonia, Bayview and Mount Baker. The officers elected are: Harrison Clothier, Fairhaven, Wash., President; H. P. Downs, Vice President; W. J. McKenna, Bayview, Wash., General Superintendent; C. S. Moody, treasurer; F. J. Crampton, Secretary; A. H. Allerton, Chief Engineer.

Natchez, Alexandria & Texas.—The engineers have just returned to Alexandria, La., having completed a preliminary survey from that town southwest to the Sabine River, about 73 miles. The engineers are now completing the profiles, and it is expected that the locating survey will be commenced as soon as that work is finished. C. E. Roberts, of Alexandria, La., is President.

Natchitoches.—The tracklaying of the branch from Natchitoches, La., to Grand Ecore, was awarded last week to Green & Brogan, of New Orleans. The track is now being laid on the five miles graded.

Nelson & Fort Sheppard.—The locating survey has just been completed for the line from Fort Sheppard, B. C., on the Columbia River, near the international boundary line northwest to Nelson, B. C., on the west arm of the Kootenay Lake. The distance is about 66 miles, and it is expected that the entire line will be completed before November, 1893. The road will be built as an extension of the Spokane Falls & Northern, with which it will connect near Fort Sheppard to reach the Kootenay mining district. The contracts for the grading will probably be awarded this winter. E. J. Roberts, of Spokane, Wash., is Chief Engineer.

New Roads.—R. J. Jephson, who has been engaged in surveying the route of the proposed road from Calgary Alberta to Knee Hill coal mines, has completed the survey to within six miles of the mines.

New York, New Jersey & Eastern.—A map and profile of the tunnel which is be built from Brooklyn to New Jersey, was filed in the Kings County Register's office this week by Charles MacReagh, as President, and by Charles M. Jacobs, as Chief Engineer. The route of the tunnel will be from Long Island Railroad station in Brooklyn at Flatbush avenue, under Fulton street, to Clark street, to Pineapple street, under the East River to Maiden Lane, and across New York City to Cortlandt street, to Hudson River. The project is one proposed by Austin Corbin.

Orangeville & Lehigh.—The company was chartered at Harrisburg, Pa., this week to build a line from Orangeville in the County of Columbia, to a point near Houser Mill, in Monroe County, Pa. The length of road is 70 miles, and the capital stock is $70,000. Rudolph T. McCabe and S. B. Haupt, 20 Broadway, New York City; P. S. Page, John P. McCabe, Arthur H. Christy, Timothy Burke and F. L. Phillips, of Scranton, Pa., are incorporators.

Orford Mountain.—The first construction train reached Kingsbury, Que., on Nov. 30. The last spike connecting Kingsbury with the rails of the Dominion were driven by Major Williamson and Judge Foster, President of the company.

Ottawa & Gatineau Valley.—Mr. Kenny, the solicitor of the company, says that next month 10 miles between Wrights and Kazabazua, Que., will be completed and ready for inspection. The surveyors and engineers are now going over the next 20 miles, which will be built next year, leaving only about 25 miles to complete the road to Le Desert.

Peoria Terminal.—Gillman & Earl, of Marshalltown Ia., have the contract for building this road at Peoria Ill. The line is six miles long, the terminals being Peoria and Bartlett, Ill.

Philadelphia & Willistown.—The company has been granted a charter in Pennsylvania. The capital is $40,000, and the line will be four miles long, from a point in Philadelphia to a point in Delaware County, Pa., near the Spread Eagle Hotel in Haverford Township. The directors are J. C. Allen, 1237 Spruce street, Philadelphia, President, and J. Clemson Sharpless, John C. Allen, Jr, and John C. Keys, of Philadelphia.

Phœnix, Mt. Olivet & Mesa.—Articles of incorporation were filed by this company at Phœnix, Ariz., recently. The capital stock is $1,500,000 and has been subscribed. The incorporators are local and Massachusetts men. The proposed line is 25 miles in length and reaches the principal towns in the valley. The work of construction will begin immediately.

Pittsburgh, Ohio Valley & Cincinnati.—This line, which was built as a branch of the Pennsylvania, was opened for regular traffic last week between Bellaire and Powhatan, O. The branch is about 14 miles long, and has been built along the north side of the Ohio River from a connection at Bellaire with the Cleveland & Pittsburgh, and is to be operated as a branch of that road.

Plymouth & Middleboro.—The Old Colony began running trains over this road on Dec. 5 last, and four daily trains will be run during the winter between Middleboro and Plymouth, Mass. The line was leased some time ago to the Old Colony for 65 per cent. of the earnings. It is about 25 miles long, the track having been laid this year.

Portland Belt.—The company has been incorporated by Russell E. Sewell, Dan J. Malarkey and Charley H. Chance, with a capital stock of $150,000 in Oregon.

Portland & Rumford Falls.—The contract for building the extension of this road from Mechanic Falls, Me., via Poland Spring to a junction with the Maine Central at a point about two miles from Danville Junction has been awarded to John Berry, of Fayville, Mass. Frederic Danforth, of Mechanic Falls, is chief engineer.

Quebec & Lake St. John.—Mr. Ridout, the Dominion Government Engineer, on his return from Lake St. John, Que., reports excellent progress being made on the new Chicontimi branch, which H. J. Beemer is building. The line runs east from Chambord Junction to Chicontimi, Que., on the Saguenay river, a distance of 51 miles, of which 26 miles are now completed and the rails down. Five miles from Chambord there is a bridge over the Metabetchouan River 500 ft. long and 60 ft. over the water, which cost $100,000. The iron work was built by the Dominion Bridge Co., of Montreal. The work between Chambord and the bridge is exceedingly heavy and costly. Forty miles of road will be completed by the end of December, and trains running over the whole line in July next. The principal stations on the branch will be St. Jerome, St. Gideon, River aux Sables, Sherville and Chicontimi.

Tionesta Valley & Hickory.—The grading has been about finished on the five miles of this road, from the village of Nebraska, Pa., to Ross Valley. No track has yet been laid, and this work will probably be deferred until next Spring. T. D. Collins, of Nebraska, Pa., is President.

Tredegar Mineral.—Several surveys for extensions of the line from Jacksonville, Ala., are proposed, but the line likely to be first placed under construction is from Tredegar Junction to a point called Burke Iron Mountain. This is about 17 miles from Bristow, Ala., on the Chattanooga Southern, and it is said that an independent company will be organized to build that section when the road reaches Burke Iron Mountain. Joseph W. Burke, Receiver of the Chattanooga Southern is President.

Victoria & Sidney.—The bonds of the company have recently been sold in England, and it is now proposed to carry on the construction work as rapidly as possible. The locating survey has been completed and the right of way is now being cleared, about 10 miles of this work having been completed so far. The road is to extend from Victoria to Sidney, B. C., a distance of about 18 miles, and it will be completed by July, 1893. The government of British Columbia has guaranteed two per cent. interest, and the city of Victoria, B. C., has guaranteed three per cent. on $300,000 of the first mortgage bonds for 25 years, making a total guarantee of five per cent. on the first mortgage bonds. The officers are: R. C. Dunlevy, President; M. H. Cowen, Vice-President; E. G. Tilton, Chief Engineer, and Robert Irving, Secretary, all of Victoria, B. C.

West Virginia, Pineville & Tennessee.—The company is grading a short section near Pineville, Ky., southward and expects to construct within the next few weeks an extension of about a mile up the right fork of Straight Creek to the coal mines. The company will build ten miles next season up the left fork of Straight Creek. J. D. Blake, of Pineville, Ky., is General Manager.

West Virginia Southern.—A charter was issued last Wednesday by the Secretary of State of West Virginia to this company for the purpose of building a road, commencing at or near Hulings, on the West Virginia Central & Pittsburgh, in West Virginia, up Cheat River and Dry Fork of Cheat River to the mouth of Glady's Fork, in Tucker County. From this point a branch will be built up Otter Fork of Dry Fork of Cheat to Alpena, Randolph County. The incorporattrs are C. Welch, of Hulings, W. Va., and five others. The capital subscribed is $30,000. The road will be used chiefly to dev-slop timber lands.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The annual report of the company for the year ended June 30 has been issued. The report covers the operations for the year of

the main company and of the St. Louis & San Francisco and the Colorado Midland roads, a total mileage of 9,338 miles. The statement of earnings for the year is as follows:

	Gross earnings.	Increase.
Atchison system	$36,438,189 I.	$2,774,473
St. Louis & San Francisco	8,895,437 I.	371,721
Colorado Midland	2,103,599 I.	135,333
Atchison general system, totals	$47,347,225 I.	$3,281,927
	Net earnings.	Inc. or Dec.
Atchison system	$11,227,255 I.	$1,606,709
St. Louis & San Francisco	3,326,618 I.	403,441
Colorado Midland	563,582 D.	17,785
Atchison general system, totals	$15,117,455 I.	$1,992,365

The gross earnings per mile of the Atchison General system were $5,070, an increase of $351, and the net $1,618, an increase of $213. The average rate per ton of freight per mile on Atchison was 1.219 cents, a decrease of .046 cent. The average rate per passenger per mile on Atchison was 2 388 cents, an increase of .031 cent. The expenditures on the general system for improvements were $1,064,700 and for equipment $192,313.

The comparative statement of operations for the month of October and four months fiscal year is as follows:

Month of Oct.	1892.	1891.	Inc. or dec.
Average operated mileage	7,130	7,124 I.	6
Gross earn	$3,744,190	$3,582 331 I.	$161,859
Oper. expen	2,478,011	2,249,831 I.	228,180
Net earn	1,366,179	1,332,500 D.	66,321
Other receipts (est.)	75,000	75,000	
Total net earn	1,341,179	1,407,500 D.	66,321
One-twelfth annual fixed charges (est.)	850,000	850,000	
Surplus	491,179	557,500 D.	66,321
Four months, July 1 to Oct. 31.			
Average operated mileage	7,130	7,120	10
Gross earn	13,977,766	13,091,630	816,136
Oper. expen	9,084,786	8,607,519	477,267
Net earnings	4,822 980	4,481,111	338,869
Other receipts	300,000	300,000	
Total net earn	5,122,980	4,781,111	338,869
Four-twelfths annual fixed charges (est.)	3,400 000	3,400,000	
Surplus	1,722,980	1,381,111	338,869

AGGREGATED GENERAL SYSTEM.

The earnings of the entire system, including the St. Louis & San Francisco and the Colorado Midland, are as follows:

Oct.			
Average operated mileage	9,341	9,338 I.	6
Gross earn	4,845,999	4,695,082 I.	150,917
Operating expen	3,156,889	2,882,320 I.	274,569
Net earn	1,689 110	1,812 761 D.	123,652
Other receipts	75,000	75,000	
Total net earn	1,761.110	1,887.761 D.	123,651
One-twelfth annual fixed charges (est.)	1,191,000	1,192,000 I.	2,000
Surplus	570,119	695,751 D.	125,651
Four Months, July 1 to Oct. 31.			
Average operated mileage	9,344	9,334 I.	10
Gross earn	18,195,868	17,023,399 I.	1,172,469
Operating expen	11,704,951	11,020,869 I.	684,082
Net earn	6,490,916	6,002,530 I.	488,386
Other receipts	300,000	300,000	
Total net earn	6,790,916	6,302,530 I.	488,386
Four-twelfths annual fixed charges (est.)	4,776,000	4,768,000 I.	8 000
Surplus	2,014.9 6	1,531,530 I.	480,386

Cape May & Sewell's Point.—This road was sold at the suit of the Camden Safe Deposit & Trust Co., at Cape May, N. J., Dec. 2. for $25,000 to Thomas E. French, of Camden, representing the trolley railroad that has been operating it the past season.

Chattanooga & Southern.—Judge Key, of the United States Court at Chattanooga, has appointed W. P. McClatchey Temporary Receiver of the Chattanooga Construction Co., of West Virginia, which built this road. The bill was filed by Carter & Ragan, who built the Pigeon Mountain tunnel for the road, and who claim $38,000 as due them. The motion to make the receivership permanent was to be argued this week.

Cheraw & Salisbury.—The road was sold at foreclosure at Cheraw, S. C., on Nov. 30 to the Cheraw & Darlington, a connecting line owned in the same interest. Both roads are operated by the Atlantic Coast Line. The line extends from Cheraw to Wadesboro, N. C., 25 miles.

Decatur, Chesapeake & New Orleans.—The United States Court at Nashville, Tenn., has ordered that the road be sold at Nashville on Dec. 21. This is the second time such an order has been made, no bids for the property having been made at the first sale in August, 1891. The road has been built for about 34 miles from Boonville south through Lincoln County, Tenn., to the Alabama state line, and some grading has been done north of Boonville toward Shelbyville, Tenn.

East & West of Alabama.—Judge Pardee, of the United States Circuit Court, has granted an order for the sale of this line on Dec. 28 in Birmingham, Ala. The road extends from Pell City, Ala., to Cartersville, Ga., a distance of 117 miles. It is owned principally by New York parties. The mortgage indebtedness of the road is $2,274,000.

Jacksonville & Atlantic.—This road was purchased on Dec. 5 by M. W. Drew for $11,500, at foreclosure sale at Jacksonville, Fla. The road is narrow gauge, about 16 miles long from South Jacksonville to Pablo Beach, Fla. The foreclosure was in the suit brought by the Southern Savings & Trust Co.

Mexican Central.—The recent visit of President Reynolds to Mexico was to obtain an extension to the original concessions for the lines from Guadalajara to the Pacific and to Tampico through Tula and Pachuca. The policy of Mexican government has recently been adverse to extensions of concessions, nevertheless the extensions of the concessions have been granted as asked for. In addition to these benefits the company has also secured amendments of the routes as first laid out, so that construction will be less expensive.

New York Central & Hudson River.—An arrangement has been made with Drexel, Morgan & Co. to extend its five per cent. debt certificates, amounting to $6,450,000 due May 1 next, for a period of 12 years with interest at four per cent.

New York, New Haven & Hartford.—It is announced that on Dec. 13 the Housatonic road, recently acquired by this company, will be operated directly. The Housatonic and Derby divisions are to be known as the Berkshire division of the New York, New Haven & Hartford. John P. Hopson, Superintendent of the New Haven & Derby, is to be the Superintendent of the new Berkshire division, with headqurters in New Haven, and William R. Lyon, Superintendent of the Housatonic, is to be his assistant. Superintendent Lyon has been located at Bridgeport, but hereafter he is to have charge of the upper end of the road, with headquarters at Pittsfield or Great Barrington. The main line will be that part of the road from New Haven to Pittsfield. From Botsford to Bridgeport the line will be known as the Bridgeport branch of Berkshire division. The Danbury division, from Danbury to South Norwalk, will be continued under Superintendent Payne. It is also said that through passenger business between New York and Pittsfield are to be run via South Norwalk. This looks like a move to freeze out Bridgeport, which has been the terminus of the Housatonic for 50 years; and it is even asserted that such is the case, the city authorities there having refused assent to important features of the road's plan to abolish grade crossings; but General Manager Tuttle denies any such intention.

Beginning Jan. 1, the Housatonic rates will be reduced to 2½ cents a mile and to 2 cents a mile where mileage books are used. Heretofore the rates were 3 cents a mile.

Ogden & Hot Springs.—Negotiations for the sale of this road, which was built in 1890 by an Omaha syndicate, has ended in the lease of the line to a Salt Lake City company, and H. W. Shurtliff, of Salt Lake City, has been elected President, and E. P. Leavitt, General Manager. Regular trains are now running over the eight miles of road between Ogden and Hot Springs.

Philadelphia & Reading.—W. W. Hart, the master and examiner appointed in the suit of Matthias H. Arnot against this road and the other corporations interested in the Reading leases, filed his report at Williamsport, Pa., this week. He finds for the companies in every point in controversy. He finds that the roads owned and operated by the Philadelphia & Reading and Lehigh Valley are not parallel and competing, and that the leases of the Lehigh Valley by the Philadelphia & Reading and the lease of the Central of New Jersey to the Port Reading is not in violation of the Constitution of Pennsylvania. The coal leases are also sustained on the ground that not more than 30 per cent. of the coal output of the anthracite coal regions of Pennsylvania is produced or controlled by the combination.

Raleigh & Western.—The Egypt Coal & Railway Co. has been reorganized under the above name and additional capital stock issued to develop the railroad and the coal mining property of the company. The road now in operation is from Colon on the Seaboard Air Line near Raleigh to Ashborough, N. C., 47 miles. Samuel A. Henszey is President and Manager, D. W. Slack, Vice-President, J. J. Sickler, Chief Engineer. Offices, Egypt, Chatham County, N. C.

Savannah, Americus & Montgomery.—S. H. Hawkins, President and Treasurer of the road was appointed Receiver at Americus, Ga., on Dec. 1. The road is 270 miles long from Montgomery to Lyons, Ga., and it has trackage rights over the Central of Georgia from Lyons to Savannah. The Montgomery extension was completed in 1891. The earnings of the company have been about equal to the fixed charges, but the company has suffered from the depressed state of business in the South, and it has been necessary to expend a large part of the earnings in ballasting and improvements on that extension. The capital stock of the company is $1,100,000 and it is bonded for $12,000 a mile.

Tamaqua, Hazleton & Northern.—A mortgage amounting to $300,000 was placed on record at Pottsville, Pa., Nov. 30, to secure the payment of the principal and interest on bonds issued by this company, a coal line built in 18 by the Philadelphia & Reading.

TRAFFIC.

Traffic Notes.

The Maine Central has made a reduction of about 10 per cent. in local passenger fares.

It is reported that the Mexican and the Inter Oceanic roads have agreed upon a pool to cover inland freight traffic.

The Erie Canal was officially closed on the night of Dec. 5. A number of boats were detained by ice before that time.

The Northern Pacific has reduced the rate on flour from North Dakota to Spokane, Wash., to 80 cents per 100 lbs., C. L.

The *Times-Register*, of Salem, Va., complains that the Norfolk & Western has made a serious advance in local freight rates.

The rush of corn into Mexico was ended at midnight, Nov. 30, by the re establishment of import duties. About 300 cars were left on this side at Laredo.

The Philadelphia & Reading has put on a new night passenger train between Buffalo and New York, with through cars between Philadelphia and Buffalo.

It appears that the railroads have been doing considerable free cartage at Cleveland, O., but at a recent meeting of all the lines it was resolved to stop the practice.

Two ticket scalpers have been indicted at Washington, D. C., for selling forged passes over the Baltimore & Ohio. The blanks were stolen from the General Manager's office.

The Burlington road has invited a number of prominent physicians in Iowa to take a trip to the Hot Springs of South Dakota. The traffic manager evidently believes that the water from these springs ought to be more freely prescribed for the use of Iowa invalids.

The Louisville & Nashville inaugurated a through sleeping car line between Cincinnati and Tampa, Fla., Dec. 4, via Montgomery, the Alabama Midland to Bainbridge, the Georgia Southern & Florida to Jacksonville, the Jacksonville, Tampa & Key West to Sanford and the Southern Florida to Tampa.

The Northwest Dispatch Fast Freight Line, which operates over the Toledo, Ann Arbor & North Michigan, and the Green Bay, Winona & St. Paul, has purchased the freight cars of the Eureka Transportation Co., 1,500 in number. The Eureka Company is, we believe, the concern which started out to let common box cars to the railroads after the fashion of the refrigerator and stock car companies.

Eastbound carload shipments through Southwestern Missouri River gateways for the month of November were divided as follows:

Atchison	24.87 per cent.	Fort Scott	9.14 per cent.
Burlington	15.61 "	Chic., Gt. W'st.	4.89 "
Alton	11.54 "	Missouri Pac	13.38 "
Rock Island	8.78 "	Wabash	6.76 "
St. Paul	4.89 "		

The freight bureau of the Philadelphia Trades' League reports that it has sent out 5,121 letters and has acted upon 212 special matters since the last report, which means, we suppose, one year. The passenger committee of the Trades League says that the entertainment of the ticket sellers, at their convention in Philadelphia in September, has resulted in largely advertising the fact that the trunk lines allow passengers going to New York on limited tickets to stop over at Philadelphia.

Chicago Traffic Matters.

CHICAGO, Dec. 7, 1892.

As intimated in my last letter the Western lines adjourned without coming to any agreement as to a division of tonnage. It is given out that another meeting may be called by Chairman Midgely after Jan. 1. They were unable to agree on the placing of all business East of the Missouri River in the hands of the Chairman or Distributing Committee for equalization. The lines having their own rails both sides of the river are unwilling to place all their business in the agreement, and the lines having no rails of their own West of the river think they should be given a share of this business, if they are to be compelled to equalize on their own traffic.

The Central Traffic Association lines at their meeting last week voted to carry out the resolutions of the Trunk Line presidents so far as they are applicable to territory west of Trunk line terminals. The advisability of establishing east bound differentials on freight was considered, and the recommendations of the Joint Committee were confirmed. The establishment of such differentials will be made whenever the situation seems to demand it.

The regular meeting of the Western Freight Association has been called for Dec. 13. The docket is exceptionally long. Rates from New Orleans to the Missouri River; basis of divisions from St. Paul, etc., to trans-Missouri territory; salt rates from Kansas; divisions on Colorado-Utah traffic; reduction in minimum weights of mixed carloads of fresh meat and packing house product from 24,000 to 20,000 lbs.; switching charges at Kansas City, are some of the more important subjects.

The decision of Judge Riner in the Trans-Missouri Association case is received with much satisfaction by railroad men in this city. They have not, however, at any time thought that the result would be other than a vindication of the agreement.

Chicago lines do not look with great favor upon the scheme proposed by the World's Fair management for the establishment of a bureau of railroad information on the grounds.

Implement and vehicle men were last week heard by the Illinois State Board of Railroad and Warehouse Commissioners, representatives of Illinois roads being present. They complain that rates on vehicles in Illinois are so high that shippers from Indiana and Ohio can get into Illinois at lower rates than the Chicago dealers are offered. No decision was rendered.

Westbound traffic has been so heavy during the past week or two that all of the roads have found their empty car movement nearly equal in each direction. The Michigan Central has had to send empty cars eastward, and the Burlington is said to have done likewise. The Lake Shore & Michigan Southern and the Pennsylvania Lines have been taking about as many loaded cars west as east.

Grain shipments which had slacked up somewhat are again heavy from various western sections, especially South Dakota, and the receipts at Chicago for the month of November were over 19 million bushels, or about equal to November, 1891, and over 50 per cent. above 1890 and 1889.

F. C. Donald, whose title has heretofore been vice-chairman of the Central Traffic Association, will hereafter be known as commissioner of the passenger department.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Dec. 3 amounted to 81,484 tons, against 61,818 tons during the preceding week, a gain of 19,666 tons, and against 93,975 tons during the corresponding week of 1891. The proportions carried by each road were:

Roads.	W'k to Nov. 26.		W'k to Nov. 19.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	13,196	16.2	8,538	13.8
Wabash	3,385	4.2	2,417	3.9
Lake Shore & Michigan South.	16,867	20.7	12,218	19.8
Pitts., Ft. Wayne & Chicago	8,751	10.7	6,463	10.5
Pitts., Cin., Chicago & St. Louis	9,061	11.1	8,080	13.1
Baltimore & Ohio	3,833	4.8	3,561	5.8
Chicago & Grand Trunk	6,014	7.4	4,642	7.5
New York, Chic. & St. Louis	8,058	9.9	7,214	11.7
Chicago & Erie	7,880	9.7	6,707	10 9
C., C., C. & St. Louis	4,379	5.3	1,878	3.0
Total	81,484	100.0	61,818	100.0

Of the above shipments 6,003 tons were flour, 35,511 tons grain and millstuff, 12,233 tons cured meats, 12,773 tons dressed beef, 4,579 tons flaxseed, 2,787 tons hides and 5,912 tons lumber. The three Vanderbilt lines carried 46.8 per cent., the two Pennsylvania lines 21.8 per cent. The lake lines carried 44,025 tons, against 77,253 tons during the preceding week, a decrease of 33,228 tons.

Winter Travel to Florida.

Hotel keepers, hotel servants and traveling salesmen are pouring into Jacksonville from the North. Hotel and railroad men think there will be more tourists in Florida this winter than ever before. The season at St. Augustine will begin Jan. 1, but in Jacksonville and the resorts further South the leading houses will be ready for business early in December. The completion of many miles of railroad leading to the southernmost portion of the peninsula has had the effect of diverting considerable travel from Jacksonville. Despite the competition of the railroads, the St. John's River steamers still find profit in carrying passengers and freight. River rates are now much cheaper than they were before the railroads came.—*Press dispatch.*

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE General Manager.

THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 232,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

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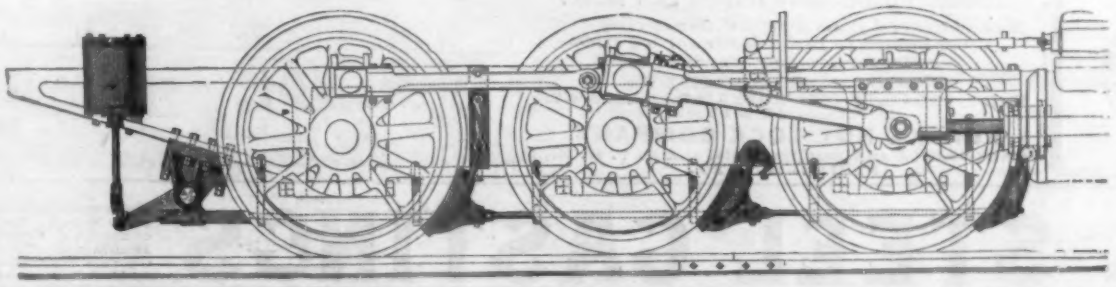

Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers furnished to operate with either STEAM AIR or VACUUM.

THE AKRON TOOL COMPANY,

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Manufacturers of McNEIL'S PATENT BALANCED CHARGING BARROW—AUTOMATIC DUMP.

ONE MAN CAN HAUL A TON.

For Use on Docks, R. R. Coaling Stations, Boiler Rooms Iron Works, Foundries, Etc.

OFFICE OF UNION ROLLING MILL CO.,
CLEVELAND, O., Oct. 15, 1892.

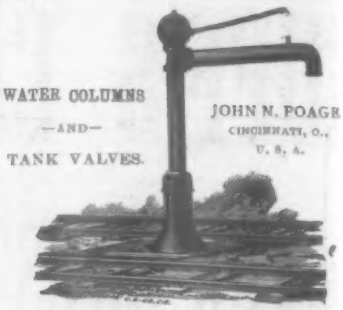
The Akron Tool Co., Akron, O.:

GENTLEMEN: Referring to your letter of recent date, we would say that we were one of the first to use the McNeil Charging Barrow. In fact we believe we were THE FIRST to use them. We now have twenty-four of them and are very well satisfied with them. We can confirm the testimony of Sept. 16, 1890, a copy of which you have in your circular, after two more years' use of the Barrows.

Yours very truly, UNION ROLLING MILL CO.,
WILLARD FULLER, Supt.

We Also Manufacture a Full Line of STEEL WHEELBARROWS for All Purposes.

WRITE US FOR DESCRIPTIVE CATALOGUE, PRICES, ETC.



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A Resilient Spiral Spring Washer with Ratchet-Shaped Teeth.

This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

Patented.

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THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

Seventy Millions in Use in Railroad Track

For Use on All Kinds and Classes of Work.

Made for all sizes of bolts.

A trial is requested.

Samples free of expense.

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Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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Patentees and Sole Mfrs., SCHUYLKILL FALLS, Philadelphia, Pa.

THE STANDARD COMBINATION TIE PLATE AND BRACE

POSSESSES THE FOLLOWING MERITS:

1. It prevents absolutely the canting of the rail into the tie, thereby greatly increasing the life of the tie.
2. It prevents the rails from spreading or canting over and wearing one side only.
3. The combination of the brace and plate obviates the necessity of spiking the rail and brace separately, thereby saving two spikes and securing the service of the *inside* spike for *holding* the rail; it also prevents the rail from working up and down, and laterally, thus making it impossible to wear the *neck of the spike.*
4. The plate and brace being made of malleable iron, is practically indestructible.

The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

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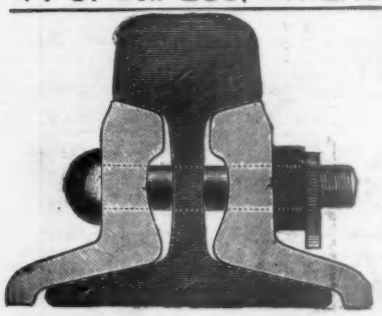

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Patented In United States and Abroad.

This is a lock nut proper as distinguished from a washer. No spring which loses its power with use; no sharp edges which destroy bolt or nut thread, or injure nut or rail splice. This lock does not try to cure evils by destruction, but does make use of natural laws with great success and benefit to permanent way. Try it by sending size of bolt and splice to

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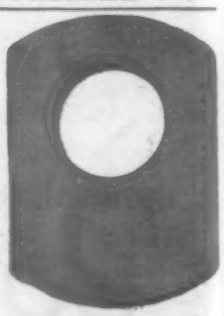

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Manufactured from best crucible spring steel. Never known to fail. Made for all sized bolts, for iron or woodwork.

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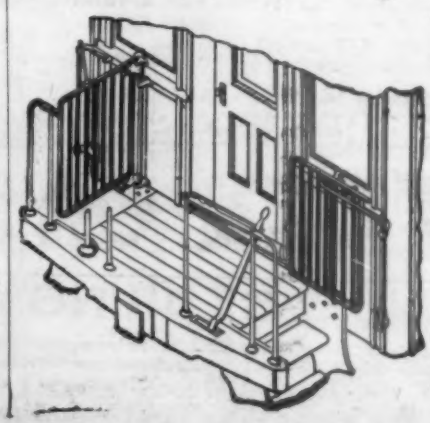

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To run trains with Brasses requires (by actual test) one-third more coal than with Tubular Rolling Bearings. Ninety per cent. of lubricating oil saved, and every bearing guaranteed for 200,000 miles. Coal and oil savings alone more than cover the extra cost in 50,000 miles. No delays from "hot boxes." Trains save from $250 to $300 per car per year, within the term of guarantee.
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STEEL CASTINGS FOR RAILROAD WORK A SPECIALTY. CRANK SHAFTS, GEAR WHEELS, COUPLERS, KNUCKLES, DRAW BARS, BRAKE-SHOES, ETC.

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STEEL BRAKE-SHOES.

THE ROSS ALL-STEEL BRAKE SHOE

Saves Money All Around.

IT SAVES SHOES. IT SAVES TIRES. IT KEEPS ENGINES OUT OF THE SHOP.

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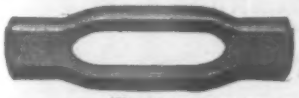

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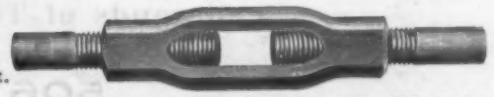

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3 Drops	8	feet.
2 "	15	"
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Malleable knuckle without *bend* or *break*, with strap on nose of knuckle.

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Absolutely Automatic.
Pulling Capacity 132,000 lbs.

Are now offering the only first-class equipment obtainable, and consisting of the **Columbia Universal Car Coupling**, the **Cushioned Carrier Iron** and **Cushioned Continuous**, or Single Action **Draw Gear** for heavy freight and passenger traffic. The **Columbia Universal Coupler** prevents all knuckle breaks heretofore caused by connection with the link type.

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This Coupler Meets Every Requirement of the M. C. B. Standard.
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Direct drop of full sized pin makes a double lock formed by draw bar at "C" and Pin "D." Equally strong if pivot pin "A is lost. Should pin be lost, use any link—no chains being required. The strongest Knuckle and Coupler known. Cannot be unlocked by any jolt of the cars. Couples with all M. C. B. types. The locking pin drops behind the step on rear of Knuckle "K," and keeps the knuckle always open when cars are separated. Removing the pivot pins, 33 loaded gondola cars were drawn from Paterson, N. J., to West End (18 miles), the pull being entirely on the DOUBLE LOCK.
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Capacity, 350 WHEELS PER DAY. ERIE, PA.

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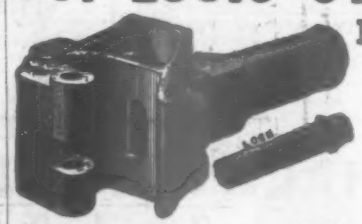
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WM. V. WOLCOTT, President. HENRY O'HARA, Vice-Prest. GEO. A. BANNANTINE, Secretary.

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HAVE YOU SEEN THEM?
McGILL IRON WORKS CO.,
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HINSON COUPLERS
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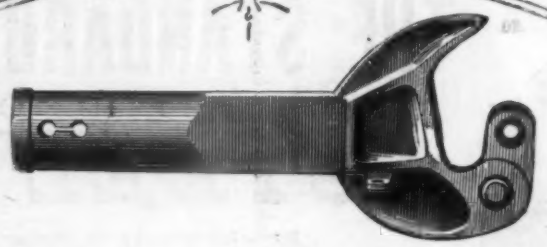

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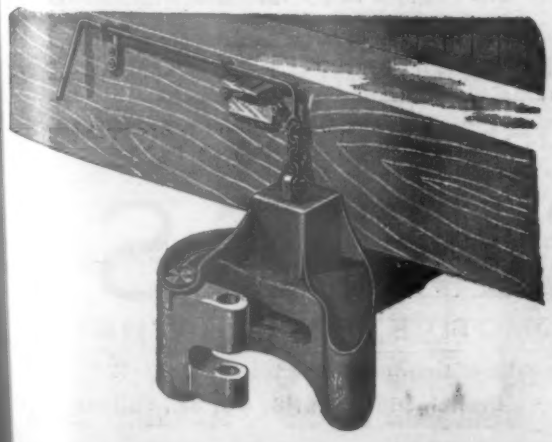

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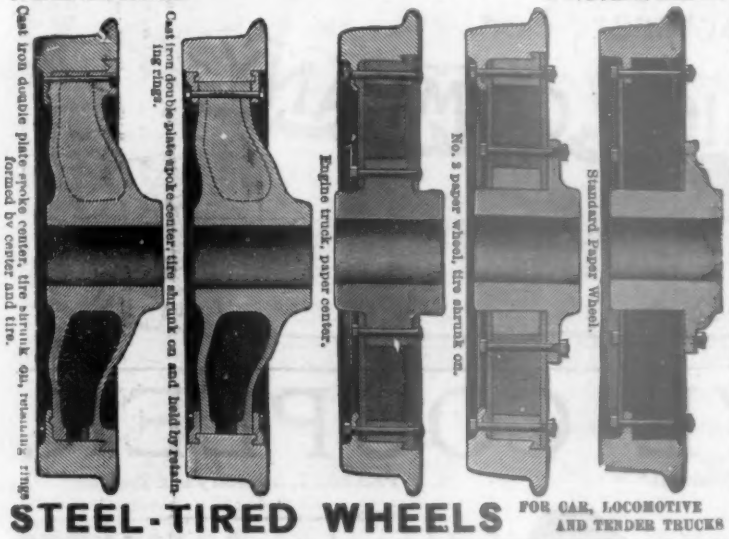
Cast iron double plate spoke center, tire shrunk on and held by retaining rings.
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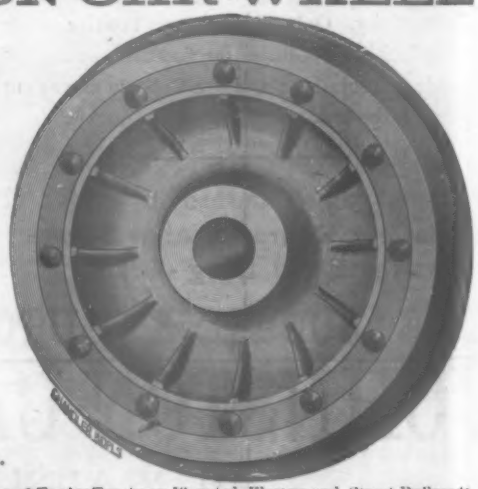
RECORD 40,000 MILES.
1-16 INCH WEAR.



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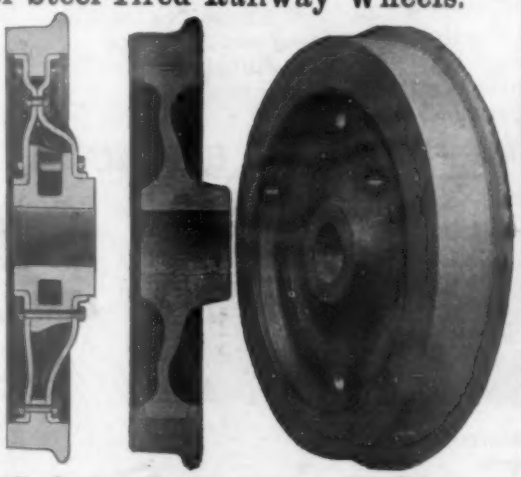

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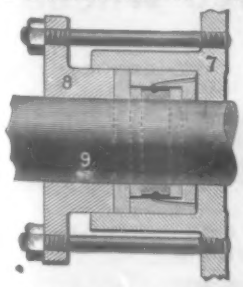

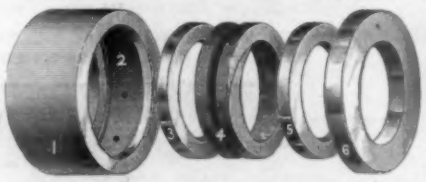

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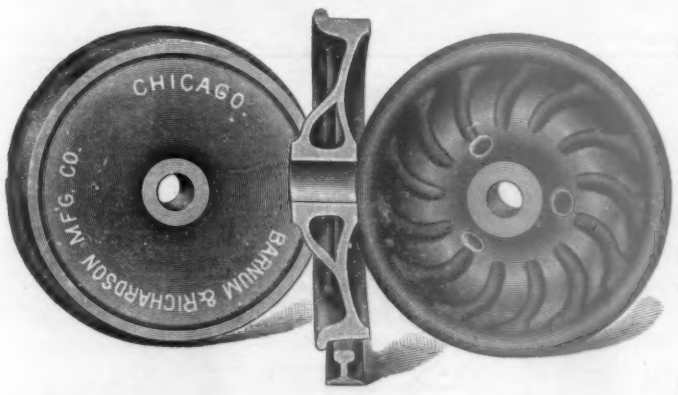

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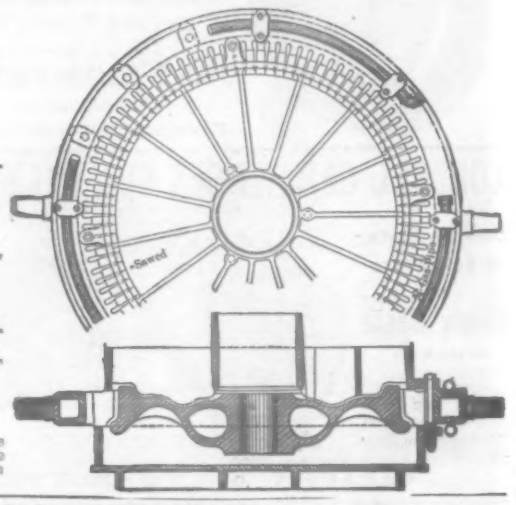

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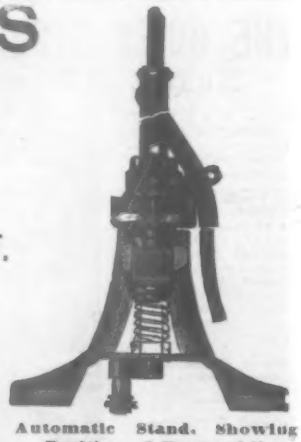

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WITH TIRES HAVING ANNULAR WEBS.

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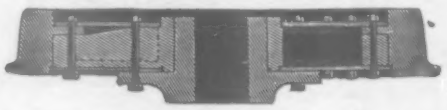

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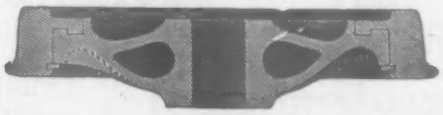

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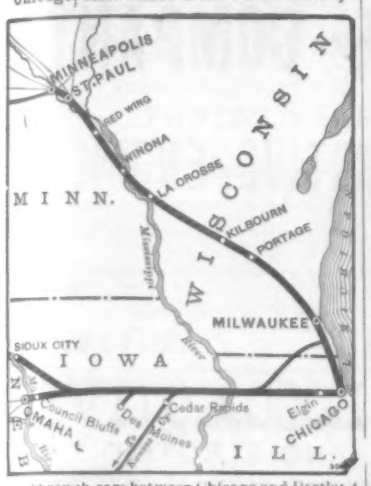

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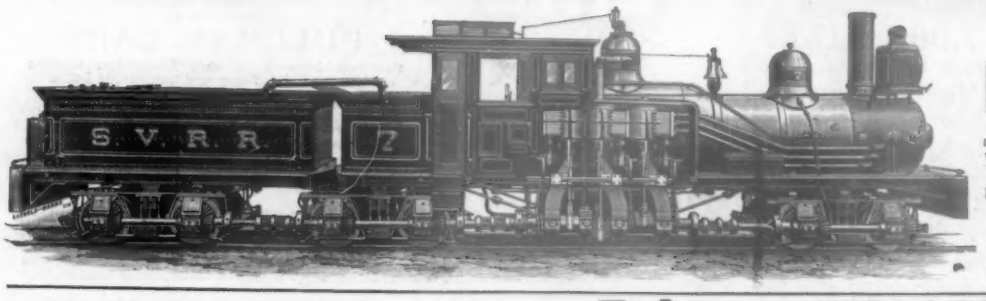

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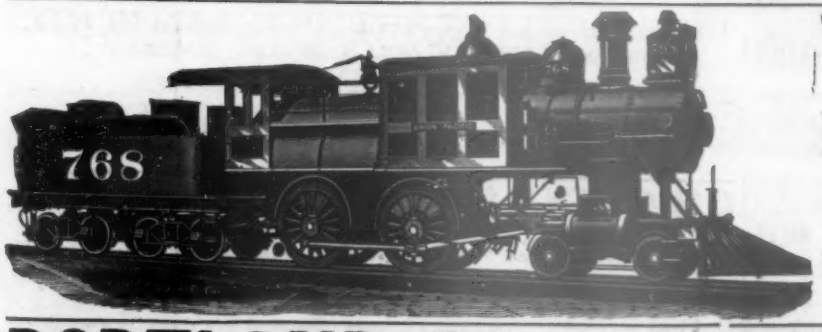

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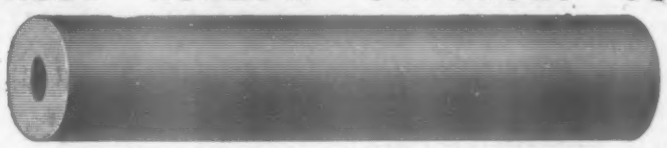

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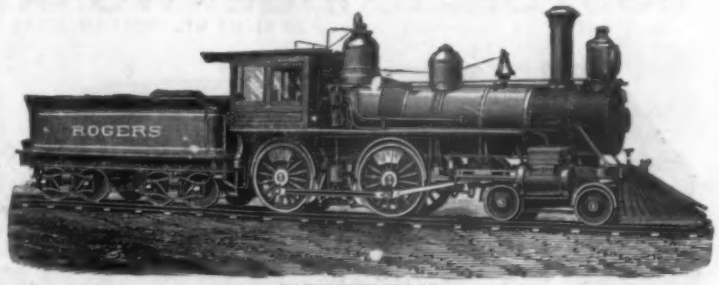

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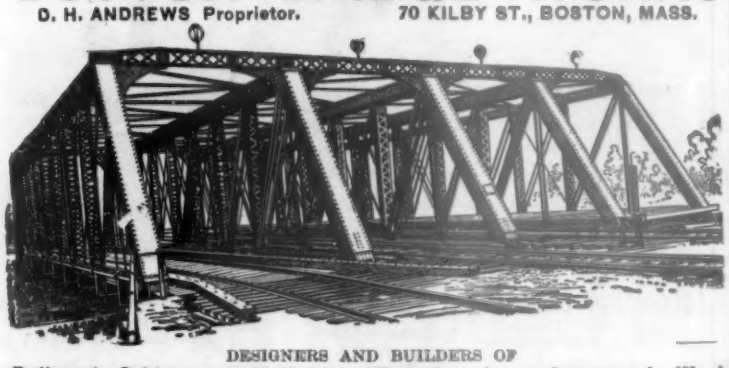

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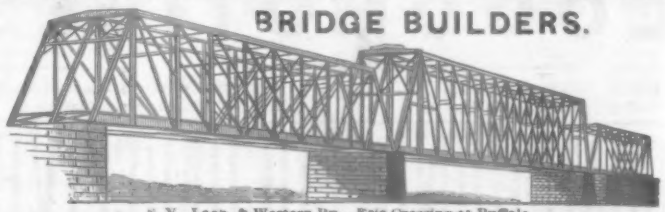

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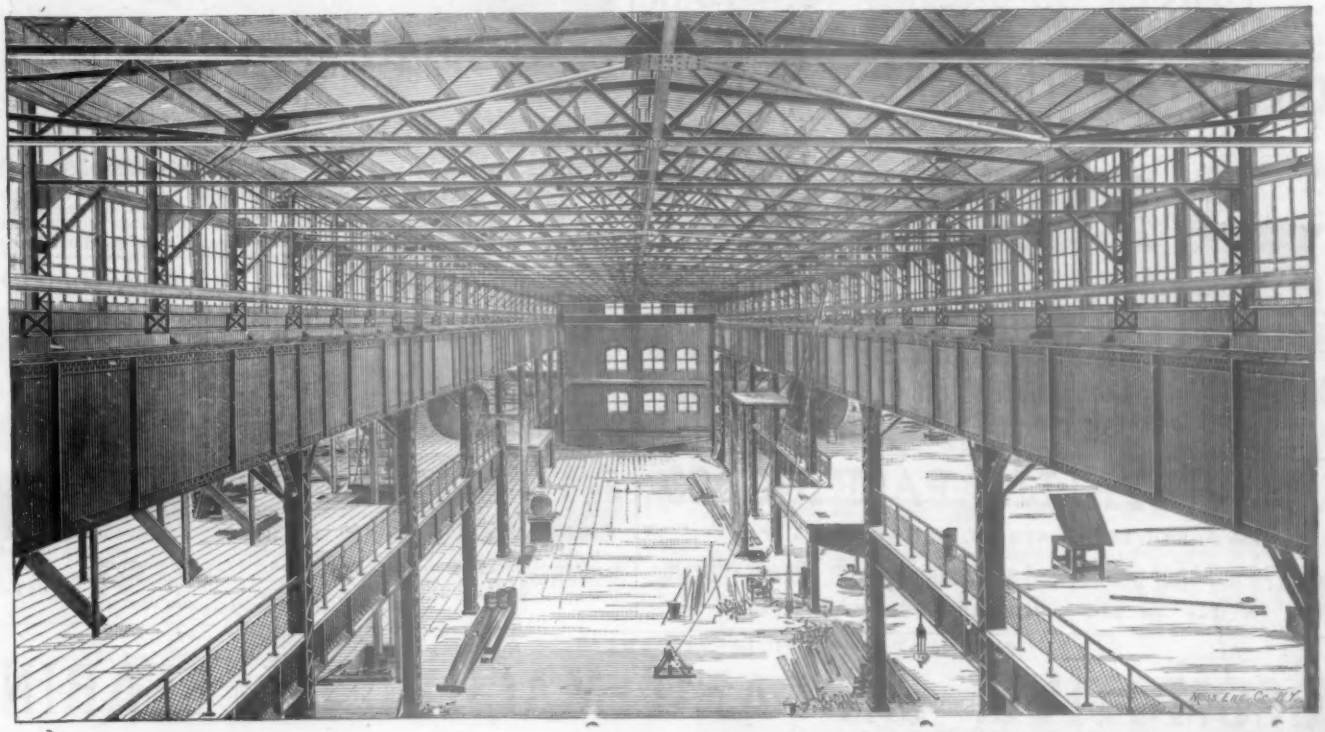

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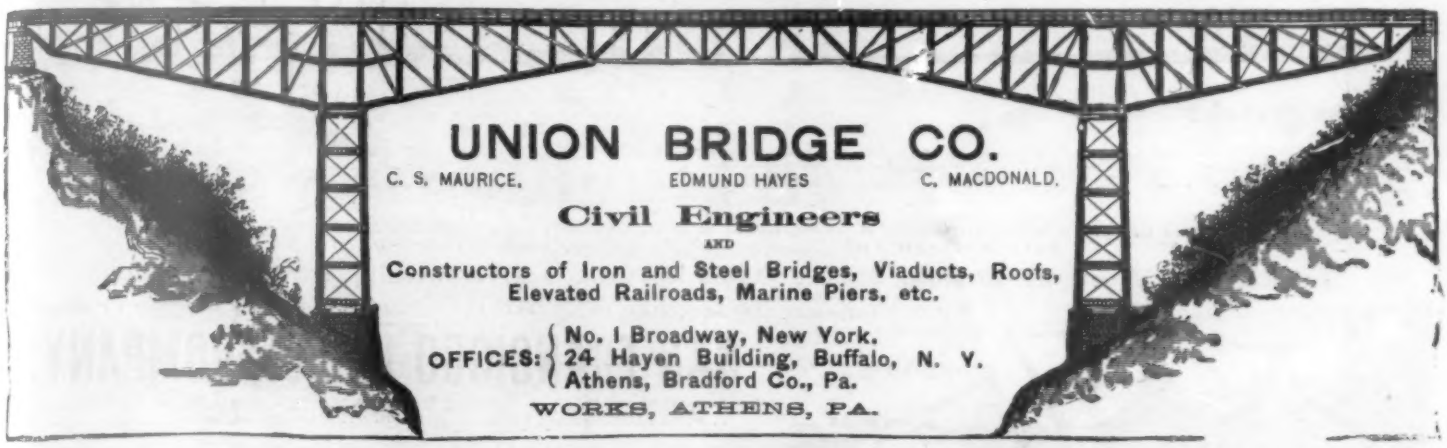

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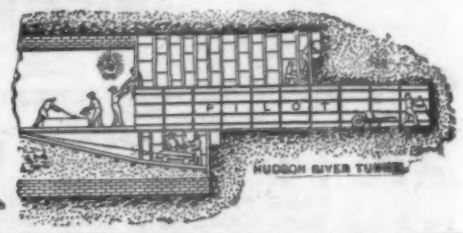

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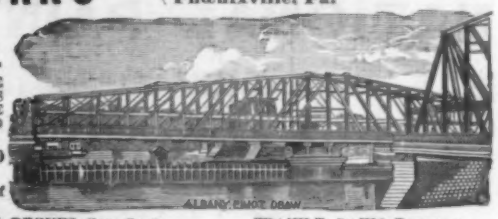

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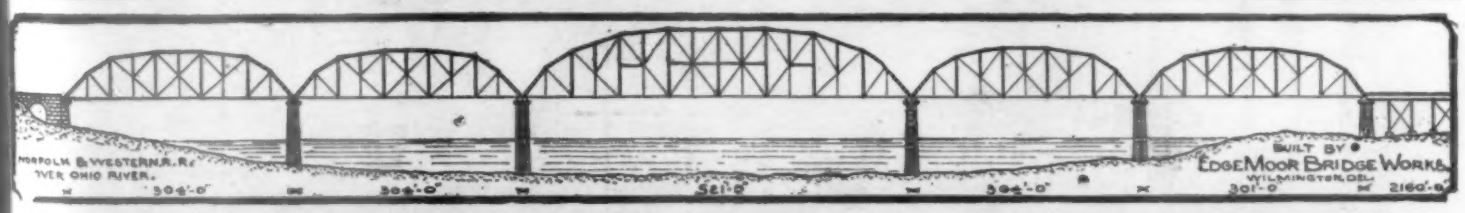

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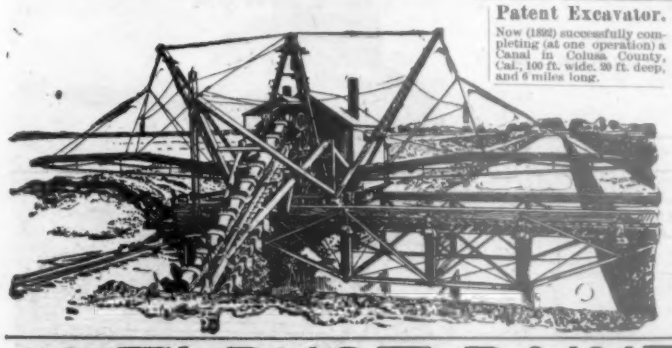

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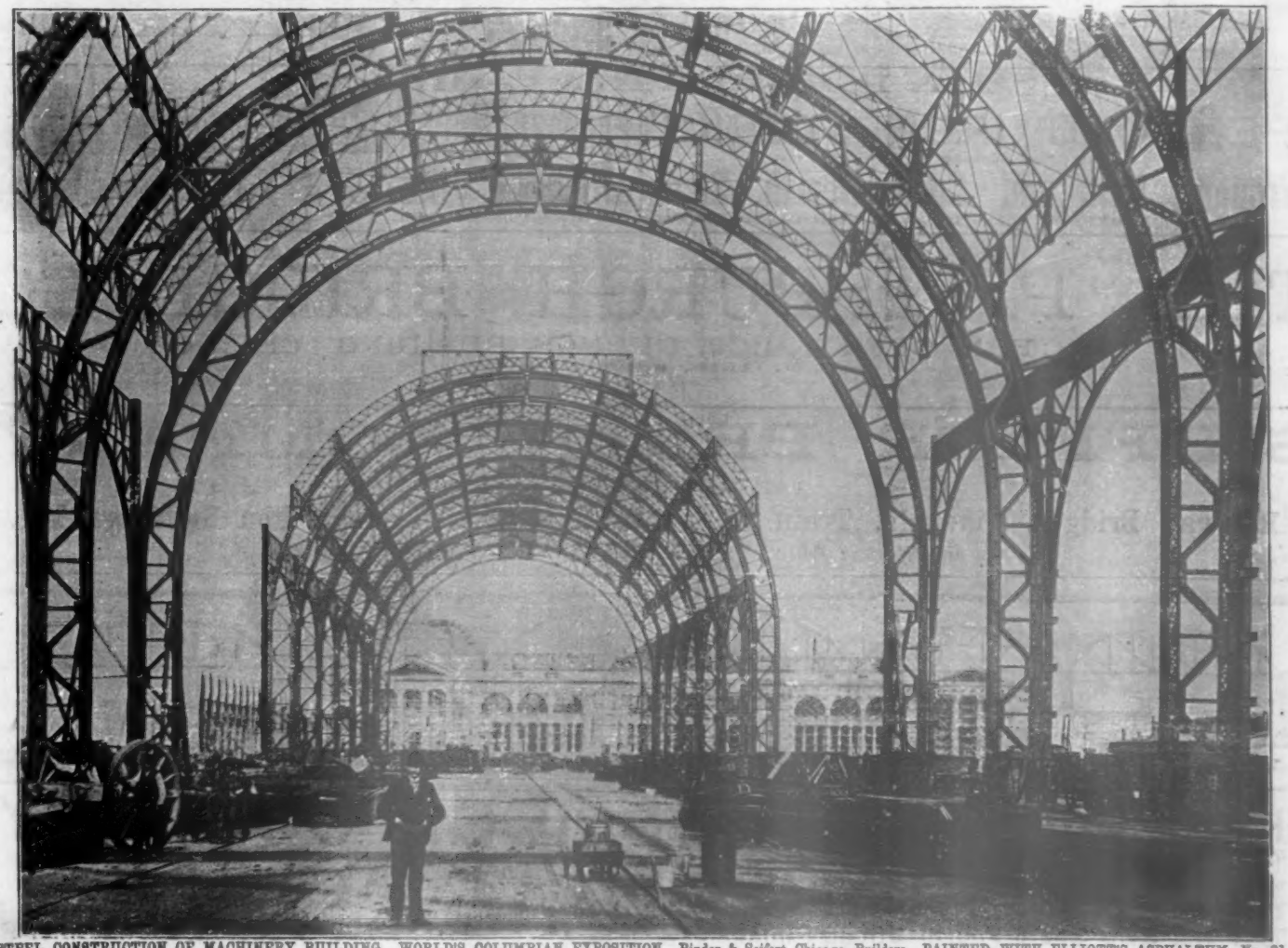

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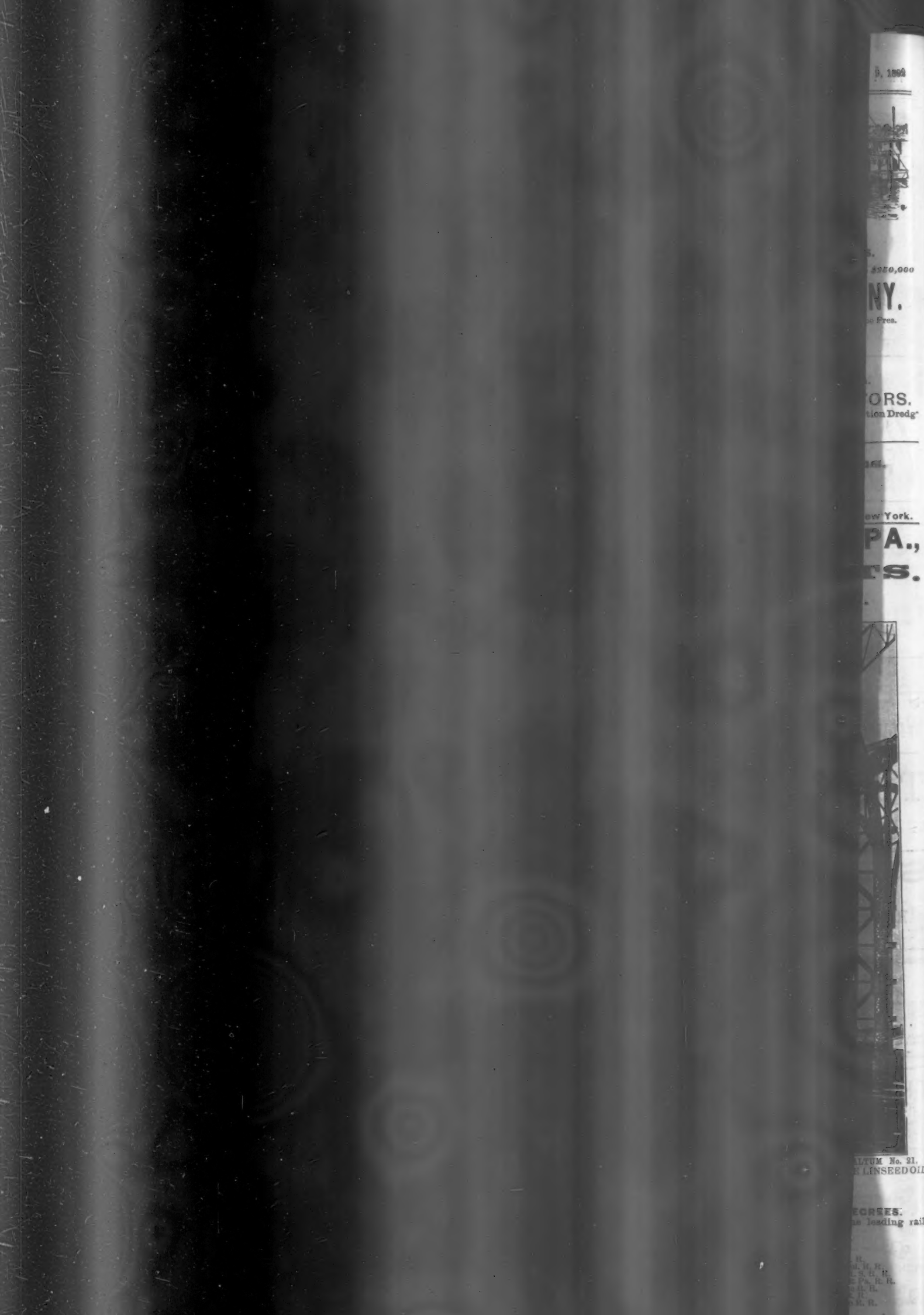

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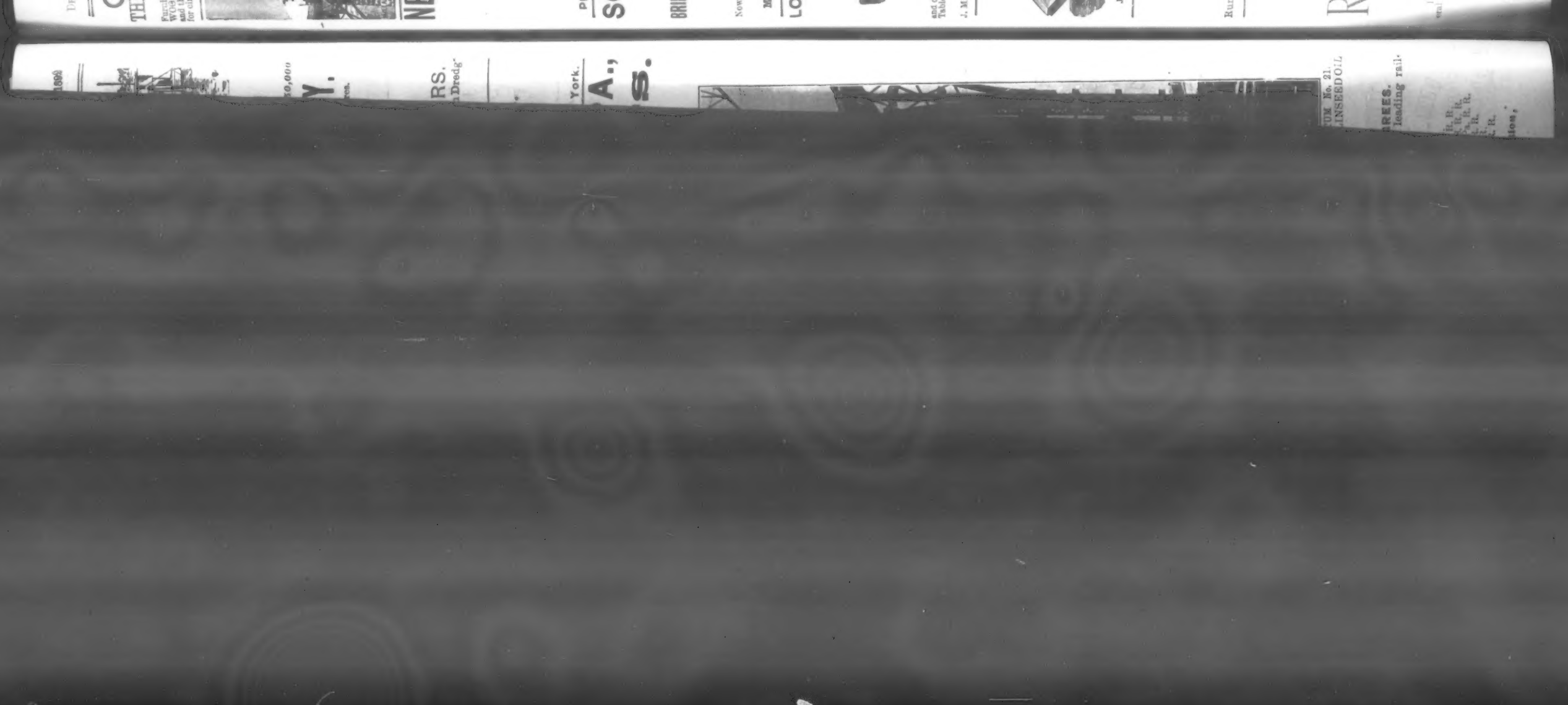

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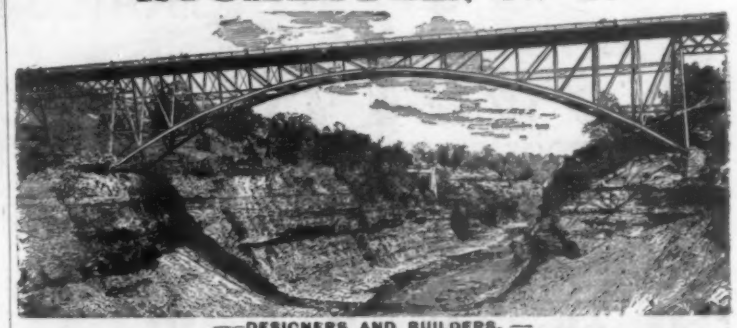

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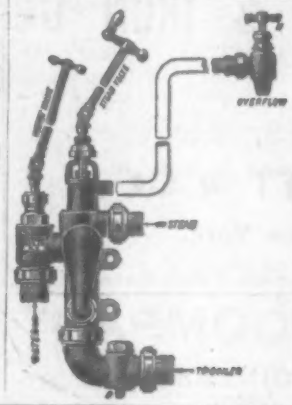

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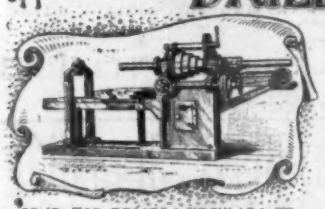

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